PTV | GROUP

MODULES OVERVIEW

PTV Vissim Modules

Common Add-ons

➧ **Automotive**	Automotive package. Includes the following features:

- High Calculation Frequency for XiL Support (up to 1000Hz)

  Vissim can perform calculations with a frequency higher than the usual 20 Hz (adjustable up to 1000 Hz). Can be used for use cases where X (hardware, software…) in the loop is used and requires outputs from Vissim in high frequency without the need for interpolation.

- Planned: Easy Driving Behavior Set-Up through presets.

  This allows you to easily modify the traffic as a test environment by changing the driving behavior aggressiveness or driving behavior adaptations to weather conditions in a simple way based on presets.

Further features might be added in the future.

➧ **BIM Import**

The BIM import module converts BIM (Building Information Model) files of the IFC (Industry Foundation Class) file format into INPX files. The resulting INPX files are destined for pedestrian simulation. Thus, the BIM importer module is offered for usage with Viswalk.

IFC export is offered by most, if not all CAD software tools such that in this way a general data flow link between CAD and Viswalk is available.

This importer converts slabs to areas, walls to obstacles, can handle stairs, and maintains the floor/level structure. Curved slabs and slabs with holes are automatically processed in a way that is appropriate for usage in Viswalk.

Typical use case:

- Import of building objects as Viswalk objects for pedestrian simulation

➧ **Bosch**

With this add-on module, Vissim can use the cloud service ESTM by Bosch for emission calculation. The individual vehicle trajectories are sent to the Bosch server at the end of a simulation run, and the resulting emissions of CO_2, CO, NO_x, HC, and particles are determined with a resolution of 1 simulation second. Results are shown inside Vissim in the link evaluation and network evaluation.

Typical use case:

- Emission calculation based on Vissim results

➧ **Cloud Model**

Users can upload models from the desktop product into the cloud. Cloud models can be opened and saved like normal models using the desktop product. Cloud models can be managed in the model management app accessible with a browser. Access to the models is shared with users who have access to the same subscription.

Typical use case:

- Working with cloud models, i.e. open/save model edits to the cloud (up-/download of incremental changes)
- Alternating edits by multiple users
- Use of comments for edits uploaded to the cloud

➧ **COM Interface**

COM (Component Object Model) interface is a scripting interface that offers access to all Vissim network data (objects and their attributes), and provides options to automate Vissim and functionality for applications beyond the capabilities of the Vissim GUI (graphical user interface). The COM interface module also includes event-based scripts, which allows the simulation of systems that respond to different simulation states and/or influence the simulation with embedded scripts.

COM supports different programming languages, for example, Python, VBA/VBS, JavaScript, and others. More details are described in the document "Introduction to the Vissim COM API" which is accessible directly from the Help menu.

The COM interface *is* an API but is not part of the add-on module "API".

Typical use case:

- Adding or removing objects during a simulation run
- Checking or changing attribute values of objects (if the actions are more complex than using attribute modifications)
- Performing special evaluations
- Multirun control with changing parameters

Dynamic Assignment

The Dynamic Assignment module is used to automatically distribute vehicles among the routes available. Users only need to specify an origin-destination matrix and the parking lots assigned to the corresponding zones. They are not required to enter static routes manually.

In a series of simulation runs, vehicles travel on an increasing number of possible routes, and the average travel times are calculated. Using this information, the program continuously adapts the distribution of vehicles among the routes, using vehicle-specific weight factors for travel time, route distance, and costs (e.g. toll).

Various parameters are available for the selection of the destination parking lots, routes, and iteration processing. Navigation devices and parking management systems can also be modeled.

Typical use case:

- Larger models with several path alternatives between origin and destination
- Larger models or subnetworks imported from Visum for detailed investigation
- Corridors with existing demand matrices (to avoid having to define routes)

EnViVer Pro

EnViVer Pro is a tool used to calculate emissions based on vehicle record data. It is based on the microscopic exhaust gas/emission model VERSIT+ by TNO. This model is based on data collected from approx. 2,800 vehicles, whose emissions were measured under several driving conditions. EnViVer Pro imports the PTV Vissim vehicle record files and calculates the CO_2, NO_x, and $PM10$ emissions in the study area at spatial detail. Results are shown in the GUI of EnViVer.

Typical use case:

- Emission calculation based on Vissim results

EnViVer Enterprise

In addition to the functions of EnViVer Pro, EnViVer Enterprise allows the modeling of additional vehicle classes, individual time periods as well as the automatic processing of several input files.

Typical use case:

- Emission calculation based on Vissim results

GUI

Graphic user interface. Not available for the Kernel version.

Landside Demand Generator

Offers a script-based solution to provide a semi-automated workflow to convert external flight data (such as flight schedule, passenger arrival time patterns etc.) into Vissim-simulation-ready data in order to model landside traffic of an Airport Terminal. The resulting demand is written to a specifically prepared Vissim network which then allows simulating vehicular traffic at an airport forecourt where the demand is generated from a flight schedule and further airport-related data provided in a special Excel worksheet. Once the suitable Vissim network is set up, changes of flight-related demand volumes do not need to be coded in the Vissim network directly as this data may be changed through the demand model generator and an updated Vissim network is prepared via scripting in a single step.

Typical use case:

- Model vehicular & pedestrian traffic at the curbside of an airport where vehicle & pedestrian volumes are based on a flight schedule

Managed Lanes

Allows the definition of general-purpose lanes and managed lanes: the decision model and price model can be defined for toll pricing scenarios.

Typical use case:

- Investigation of toll pricing scenarios on highway sections where the main road (free of charge) is accompanied by a parallel paid alternative road (typically used in North America).

➡ **Mesoscopic Simulation**

This module allows you to simulate larger networks in a higher speed compared to the classical microsimulation. The underlying driving behavior is still based on single vehicles and time intervals of e.g. 0.1 seconds; however, vehicle behavior is not updated in every time step, but only for certain events like driving on a new link or a signal controller changing to green.

The main advantages of this mesoscopic simulation are higher speed of simulation and less effort of network coding and calibration, as fewer details are required.

If some areas of the network shall be simulated with all details known from the microscopic simulation, the user can choose to run a hybrid simulation with certain parts being mesoscopic and others being microscopic.

Typical use case:

- Large models (city-wide or regional) where a simpler driving behavior model is sufficient and results in a high-speed simulation even on a large scale.
- Models where only a smaller part(s) need(s) to be investigated in very high detail (microscopically) and the rest in a simpler way but with less computational requirements (mesoscopically) = hybrid models.
- Larger models (or subnetworks) imported from Visum – this does not require further network modeling effort in Vissim.

➡ **Viswalk**

PTV Viswalk provides a complete simulation of pedestrians and is seamlessly integrated with PTV Vissim. The dynamic model is based on the social force model, developed in 1995 by Prof. Dirk Helbing. It allows the free movement of pedestrians within specific levels. Pedestrians find the way to their destination without users having to create a network that specifies trajectories. A limited number of 30 Viswalk pedestrians are available in each Vissim license.

A pedestrian simulation based on directed links (in contrast to areas) is included in PTV Vissim right away. Like the simulation of vehicles, it is based on the car following model of Wiedemann. PTV Viswalk is not required for this type of pedestrian simulation.

Typical use case:

- Pedestrian-vehicle interaction for intersection design and curb space planning
- Simulation of commuter or traveler movements in public transport terminals, multimodal transportation hubs, or airports
- Emergency egress simulations for fire safety planning
- Mass event planning & optimization
- Optimization of pedestrian movements in buildings for various purposes as for example lift usage or suppression of the spreading of an infectious disease.

Deprecated Add-ons

3D package

- V3DM

(Now available within the basic Vissim license)

Since Vissim 2023, this add-on is no longer included in the installation. Its functionality is replaced by the support of *.fbx 3D models and animation control directly in Vissim. If you still need V3DM, install Vissim 2022 version.

V3DM allows users to convert 3D models of the formats DWF, 3DS (both by Autodesk) and SKP (Trimble Sketchup) into V3D, the PTV Vissim 3D format. This works for both vehicles and static models. Besides basic scaling and positioning functions, V3DM allows to define additional vehicle attributes (colors, axles, indicators, doors, etc.).

Moreover, V3DM can also be used to create simple 3D models (for example buildings) with texturized surfaces that make them look more realistic. In V3DM, users can define up to 30 states for dynamic 3D objects (e.g. variable message signs controlled via Attribute modifications or COM) and export them to a V3D file.

Typical use case:

- Creating a 3D model with several 3D states (like an entry barrier with multiple 3D states for opening and closing)

▪ ~~3ds Max Export~~	Network data and vehicle positions are exported from PTV Vissim as a text file and can be imported into third-party software (e.g. Autodesk's 3ds Max software).
3D network geometry	Typical use case: Data export for high-end visualization in third-party software
	The previous menu entry "3ds max…" (File>Export>3ds max…) is renamed into "3D network geometry". The script for 3ds max is not provided with the installation anymore but can be obtained from PTV on request (no support is provided for the script).
~~SYNCHRO Import~~ ~~(removed)~~	For import from Synchro use PTV Vistro and export into PTV Vissim.
	Using this module, users can generate PTV Vissim models from SYNCHRO. The network geometry, volumes, turns, vehicle compositions, and signalization are imported.
	The module supports adaptive import, i.e. changes made in PTV Vissim are not lost when more current versions of the SYNCHRO model are imported.
	Typical use case: Import from Synchro models
VisVAP	(Now available within the basic Vissim license)
	Flow Chart Editor for VAP. VisVAP (short for "Visual VAP") is an easy-to-use tool for defining the program logic of VAP signal controllers as a flow chart. All VAP commands are listed in a function library. The export function allows users to generate VAP files. This saves additional changes to the VAP file.
	Moreover, VisVAP provides a debug functionality that during a running simulation allows users to go through the control logic step by step. It also shows the current values of all parameters used in the logic.
	Typical use case: Convenient editor with debug functionality for all VAP use cases

Signals (basic)

This includes the following signal control types:

- Fixed Time (signal group-based)

  Typical use case:

  - Fixed time signal controllers which are based on signal groups (in contrast to stage-based): Create as many signal groups as required and define end times for red and green, duration of red/amber and amber, cycle length and choose one of the predefined signal sequences for each signal group. For stage-based signals use Vissig.

- Fixed Time (simple)

  Typical use case:

  - Simple fixed-time signal controllers which are based on signal groups
  - Simulations with Vissim Linux Kernel
  - If parameter changes during the simulation are needed

- Ring barrier controller level 1 (RBC controller made by PTV only)

For the following signal controllers, all required objects (signal heads, detectors, conflict areas) can be generated automatically by Vissim by using the corresponding button in the vertical action toolbar. Pre-parametrization & post-adjustment are possible as well:

- Pedestrian Crossing: A calling detector activates the green for a specified duration

  Typical use case:

  - On-demand pedestrian crossings with a push button or automatic pedestrian detection.

- Railway Crossing: A calling detector activates the green until the check-out detector is called.

  Typical use case:

  - Railway or tram crossings

- 2-Stage Controller: A calling detector activates the green for the minor road for a specified duration.

  Typical use case:

  - Simple 2-stage actuated signal control. For a more complex control scheme use VisVAP.

- Ramp Metering Controller

  Typical use case:

  - Ramp metering on a freeway, based on ALINEA algorithm

Signals (advanced)

This add-on includes other signal controllers developed by PTV: Vissig, VAP & VisVAP, RBC.

Vissig
Vissig complements the fixed time control based on signal groups (which is included in any PTV Vissim version and in the PTV Visum module "Node editor/control") by additionally providing objects required for a stage-based fixed time signal control. Vissig offers a graphical editor for defining stages and interstages. Interstages can also be automatically generated. Besides the base functionality, the graphical signal program editor allows to easily extend or shorten stages and interstages. In addition, Vissig offers an interface for signal data export to the PUA format for use with VAP controllers. Hence a traffic-actuated signal control based on stages and interstages can easily be generated. All signal plan information can be exported to Microsoft Excel and easily added to reports.

Typical use case:

- Stage-based fixed time signal control with stages and interstages
- Data export for VAP controllers (generation of PUA files)
- Daily signal program lists

VAP Controller
VAP (**V**ehicle **A**ctuated **P**rogramming) enables PTV Vissim to simulate programmable traffic-actuated signal controls, both signal group or stage based. During PTV Vissim

simulation runs or in the test mode, VAP interprets the control logic commands and creates the signal control commands for the PTV Vissim network. At the same time, current detector variables are retrieved from the simulation and processed in the logic.

The VAP control logic is described in a text file (*.VAP) using a simple programming language. It can also be exported from VisVAP. The VAP signal data set (*.PUA) can either be comfortably exported from Vissig or generated manually in a text editor.

The range of applications stretches from single junction controls over public transport pre-emption to network or corridor controls. Even VMS applications such as variable speed control or temporary use of shoulder lanes are possible.

Typical use cases:

- Actuated signal control (with detectors and user-defined control logic)
- Public transport preemption
- Re-routing of traffic (changing the relative volume on routes during the simulation)
- Speed control (changing desired speed decisions during the simulation)

PTV Balance
deprecated

This product has been discontinued and removed from the product portfolio!

PTV Balance is a complete and well-proven adaptive traffic network control that is now integrated into PTV Vissim. Together with its local companion PTV Epics or on its own it updates the signal control every 5 minutes, according to the present traffic demand as measured by the sensors. The road network supply for Balance is done with PTV Visum, and the traffic signal related parameters are supplied with an extended version of Vissig. Balance has an integrated web based and user friendly GUI that allows to check the output parameters and compare them with the Vissim simulation side by side. And furthermore, this supply is the same as it would be used for real world adaptive network control projects.

Typical use case:

- Corridor wide or network wide adaptive signal control
- Coordination aka "green waves"
- Setup and calibration of PTV Balance

PTV Epics
deprecated

This product has been discontinued and removed from the product portfolio!

PTV Epics is an adaptive local signal control within PTV Vissim that was designed especially for transit signal priority. The mathematical optimization inside of Epics calculates every second the best signal plan for the next 100 seconds according to the present detector situation and transfers it to Vissim. All Epics' parameters are supplied with an extended version of Vissig. Since all types of traffic (individual, public, pedestrian) are treated in a similar way but equipped with different weights it is especially easy to accomplish transit signal priority within PTV Epics.

Typical use case:

- Single junction adaptive signal control
- Transit signal priority
- Setup and calibration of PTV Epics

RBC

Ring Barrier Controller (RBC level 3) enables PTV Vissim to simulate signalized intersections controlled according to the North American standard procedure "ring barrier controller". It provides a dedicated user interface for the RBC parameters.

Typical use case:

- Ring barrier controller including preemption and transit signal priority.

External signals

These signal control interfaces (SC types) are included in the add-on External signals.

➦ **External**   Generic controller type for simulating signal controllers that are available as a separate application (*.exe) or a program library (*.dll). These are controllers supplied by other providers or control procedures that users have developed themselves (using the API add-on).

➦ **Fourth Dimension D4**   Interface to D4 Traffic Signal Controller Software. (Only North America.)

➦ **LISA + OMTC**   Interface to signal controllers specified with the LISA+ system by Schlothauer. The actual controller DLL and the GUI for the controller parameters can be obtained from Schlothauer.

➦ **McCain 2033**   Interface to McCain 2033 Intersection Control Software. The program which operates on 2070 Controllers has an advanced feature set and user-friendly display allowing users to manage a wide scope of traffic signal applications. (Only North America.)

➦ **SCATS**   Interface to signal controllers specified according to the Australian SCATS procedure.

The actual controller DLL and the GUI for the control parameters (SCATS.DLL, SCATS_GUI.DLL, WinTraff, ScatSim can be obtained from Roads and Maritime Services, Australia)

➦ **SCOOT**   Interface to signal controllers specified according to the English SCOOT procedure.

The actual controller DLL and the GUI for the control parameters (SCOOT.DLL, SCOOT_GUI.DLL, PCScoot) can be obtained from Siemens UK.

➦ **SIEMENS VA**   Interface to intersection-specific signal controllers built with SiTraffic Office from Siemens.

➦ **TRENDS**   Interface to TRENDS signal controllers. The actual controller DLL and GUI DLL can be obtained from GEVAS Software, Munich.

➦ **VS-PLUS**   Interface to VS-Plus controllers. The traffic-actuated control software VS-PLUS is capable of handling fully traffic-actuated single intersections and coordinated networks with semi-traffic actuation. The actual controller DLL and GUI software can be obtained from VS-Plus AG, Switzerland.

Other External Signal Controllers

These external signal controllers are not included in the add-on External signals but are sold separately upon request.

➦ **Econolite ASC/3**   This module enables users to simulate signalized intersections that run on ASC/3 controller devices by Econolite, USA. It provides a dedicated user interface for its control parameters. It is sold separately from the other signal controller interfaces included in the add-on module "External signals".

API

PTV Vissim API package (Application Programming Interface) enables users to connect their own or third-party software in order to influence a PTV Vissim simulation.

➦ **DriverModel Interface**   allows for the implementation of car-following and lane change models. These are assigned to specific vehicle types in PTV Vissim and can overwrite the standard driving behavior. In result, this enables for external control of car-following and lane change. Available for both the Windows version and the Linux kernel version.

Typical use case:
- Automated vehicles with custom control algorithms
- ADAS (Advanced Driver Assistance Systems) testing

- Safety or emission optimization/testing

⬛ **EmissionsModel Interface**
is used to add user-defined emission models to PTV Vissim. Relevant vehicle attributes and dynamic parameters are available via the interface. The emissions calculated can be output in PTV Vissim evaluations.

Typical use case:
- Emission calculation with custom algorithms

⬛ **SignalControl Interface**
This package includes the signal controller type "External" which can be used for integrating custom signal controllers with Vissim. Signal controllers are implemented as DLLs, using the Signal Controller API. This API allows reading relevant information (such as detector data) and defining signal group states in Vissim.

Typical use case:
- Use of custom signal controllers in Vissim

Driving simulator Interface

The add-on "Driving Simulator Interface" allows to connect Vissim to a driving (cycling, walking) simulator (DS). That DS can either be simulator hardware used by a human or a piece of software representing the algorithms of an autonomous vehicle (or multiple vehicles). The interface allows full external control of one or several Vissim vehicles or pedestrians during the running simulation. Not included in the API package, sold separately. Available for both the Windows version and the Linux kernel version.

Typical use case:
- Co-simulation of Vissim and detailed vehicle simulation (nano-simulation) to bring one vehicle with external control as system under test into Vissim traffic as test environment
- Automated vehicles with own control algorithms
- Different kinds of Simulators or VR applications: vehicle, pedestrian, cyclist…
- ADAS (Advanced Driver Assistance Systems) testing
- Safety or emission optimization/testing

Hint: The meaningful use of the Driving Simulator Interface for Co-Simulation requires a representation of the traffic network in both software, as the exchange happens based on coordinates.