WinProp Propagation Engine

Coverage and capacity planning of wireless networks requires accurate predictions of the mobile radio channel with very short computation times for all types of cells in any kind of environment.

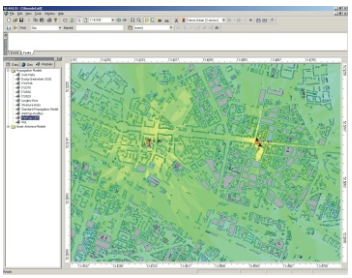
Accurate, fast, and efficient

The propagation model is one of the most important modules in a radio network planning tool. While for network optimization the computation time should be short, all physical phenomena should be considered to achieve a high accuracy. WinProp's DPM (Dominant Path Model) focuses on all relevant propagation effects and combines high accuracy with computation times in the range of empirical models. An auto-calibration with measurements allows a simple tuning of DPM's parameters.

Full range of cell types & air interfaces

To achieve the highest accuracy for macro, micro, and pico cells, WinProp considers simultaneously different types of databases (topography, clutter, vector buildings) - depending on their availability in rural, suburban, and urban environments as well as inside buildings. So all air interfaces (2G, 2.5G, 3G, HSPA, LTE, WiMAX), arbitrary antenna heights, all transmitter types, and all cells in the whole network can be planned with the WinProp propagation model.

Vector Building Data



Today, wireless networks must provide high data rates inside buildings. Therefore the actual buildings cannot be ignored in the predictions. The waveguiding in street canyons as well as the diffractions at roofs and wedges are dominating the wave propagation in urban scenarios. WinProp's DPM considers optionally the vector data of the buildings to include the most important propagation effects. This leads to a very high accuracy.

Trees and Vegetation

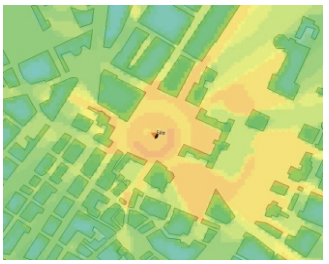
Trees and parks attenuate the propagation of electromagnetic waves. Vegetation areas are considered in the prediction and characterized by their heights and by a specific attenuation (dB/m).

Transition to large areas

Very large areas can be predicted in a hybrid mode. Around the transmitter with the DPM and far away with Atoll's standard propagation model. A weighted bilinear interpolation between the two models leads to a smooth transition.

Indoor Coverage

In-Building coverage is very important and WinProp offers two options for the indoor coverage: Either empirical indoor models without consideration of indoor walls or CNP (Combined Network Planning) including indoor walls.



Databases

The WinProp plug-in fully supports various data formats for topo, clutter and vector building data.

Plug-In for Forsk Atoll

WinProp Propagation Engine

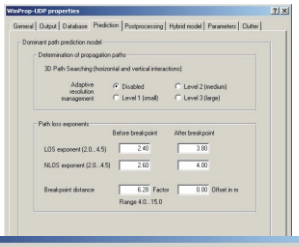
Plug-In for Forsk Atoll

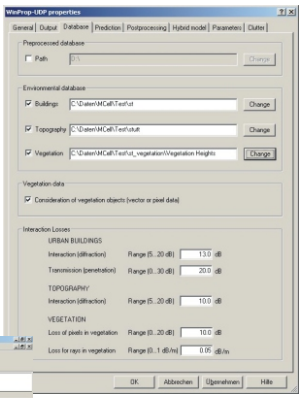
Features:

Air Interfaces

2G, 2.5G, 3G, HSPA, LTE, WiMAX

GSM/GPRS/EDGE, UMTS/HSPA, LTE, CDMA 2000, TD-SCDMA, WiMAX/BWA, Microwave Links
Frequency bands between 300 MHz and 30 GHz

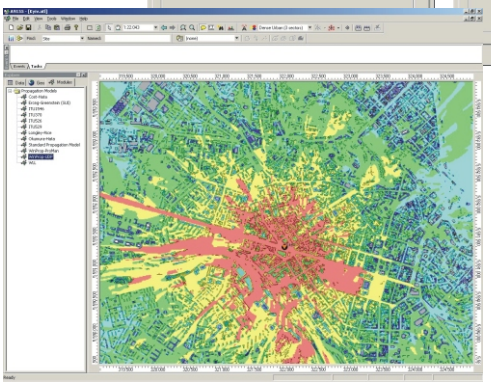




Cell Types

Macro, Micro, Pico, Femto

Arbitrary transmitter heights



Input Data

Topographical (DTM) Databases

Pixel databases

Clutter (land usage) Databases

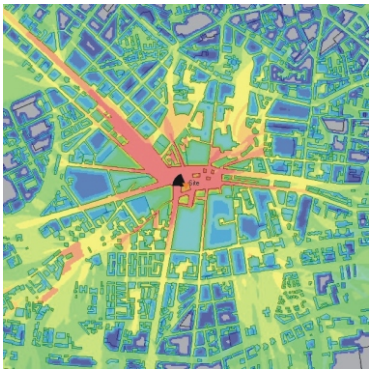
Pixel databases. Each class with individual height, clearance, and frequency dependent losses

Vegetation Databases

Pixel data (either extracted from clutter or vector data) with individual heights

Building Databases

Either 3D vector building data (cylinders with polygonal ground plane) or pixel data extracted from DEM



WinProp IRT

WinProp DPM

Prediction Models

Empirical Models (Direct Ray)

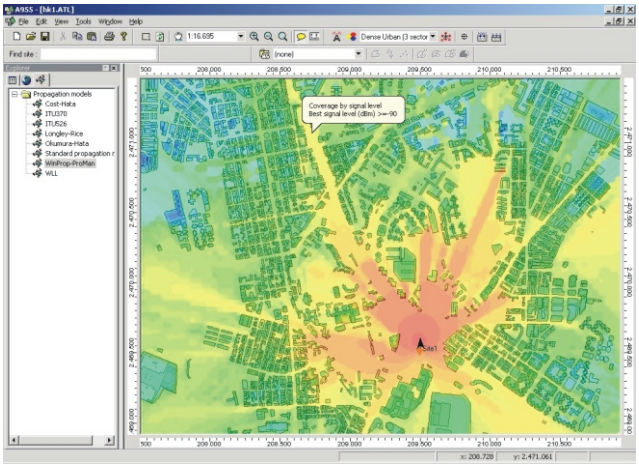
COST 231 Walfisch-Ikegami

Deterministic Models (Vertical Plane)

Knife Edge Diffraction (at topography, clutter heights and/or building data)

3D Deterministic Models

DPM (Dominant Path Model)
IRT (Intelligent Ray Tracing)



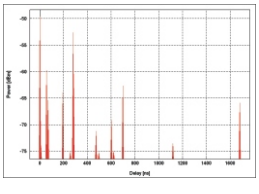
Outputs

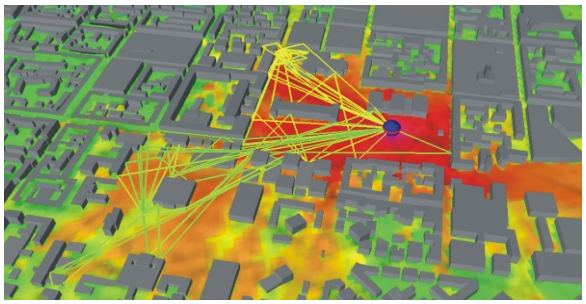
Forsk Atoll Data Format

Path Loss Map

Further Output (visualized with separate GUI)

Delay Spread
Angular Spread
Propagation Paths
Channel Impulse Response
Angular Profile
(DoA for MS and BS)





Additional Tools

Auto-Calibration with measurements

Calibration of parameters of Dominant Path Model
Calibration of clutter classes

Platforms

Propagation Module as Plug-In (DLL)
for Forsk Atoll™ and Alcatel-Lucent 9155™

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