

Waveform Training

- Copy \locarno
- Backup your license files \license*.lic
- Copy \license*.lic into c:\terra\license
- Run \setup\setup.exe (011.001 beta versions)



Waveform Capabilities

- View waveform of a point
- Extract echo length and echo normality values
- View points colored by echo length
- Classify points by echo length
- Extract returns for problem areas using specific logic:
 - **Last possible** return in dense short vegetation where default logic has not seen the ground
 - **All possible** or **All distinct** returns in places where one is missing some feature such as powerline wire
 - **First possible** return for tree tops?

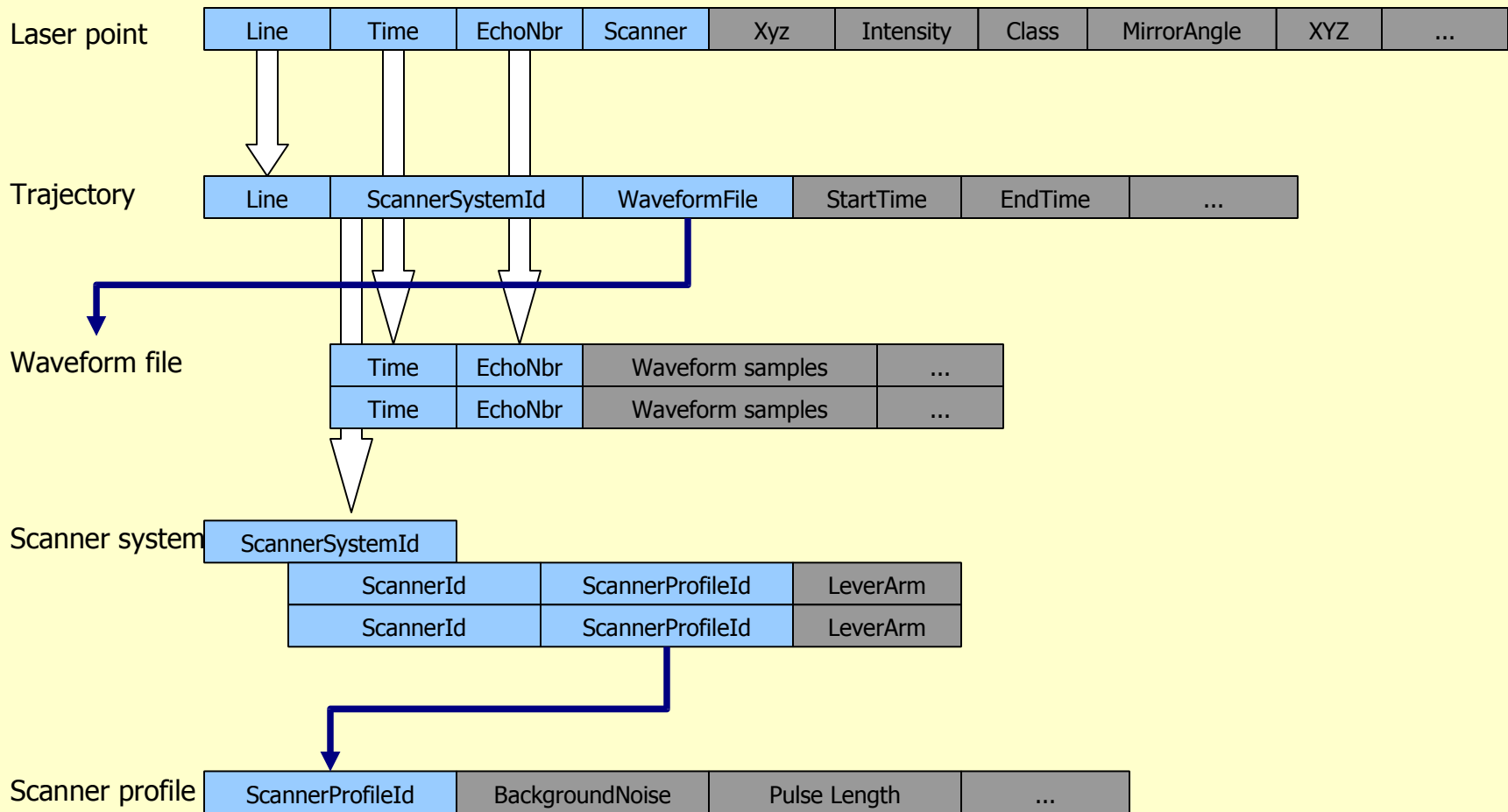
Waveform File Formats

- TopEye .TEW 1.15 (MarkII)
- LAS 1.3 – waveform information in the same .LAS file with extracted points

Waveform Workflow Principles

- Input for TerraScan is LAS 1.3 files with both laser points and waveform information
- Import laser points into project
 - Project storage must be LAS 1.0 – 1.2 or Fast Binary
 - Fast Binary can store echo length & echo normality !
 - You can not convert time stamps
- Link trajectories to waveform files
- Software reads original LAS 1.3 when it needs waveform information

How Software Finds Waveform ?



Scanner Waveform Profile

- Stores properties of typical returns from a single hard surface
 - Background noise level
 - Pulse length at 50% of peak strength
 - Pulse length at 35% of peak strength
 - Shape of the return pulse
 - System derived point position relative to return pulse
- Classify points from hard surfaces into a dedicated class
 - Some intensity variation
 - Avoid edges of scan lines
- Click **Add** in **Settings / Scanner waveform profiles**
- Select profile for the right scanner in scanner system definition

Extract Echoes

- Methods for selecting locations where to generate new points:
 - Place a fence in a section to specify a 3D slice of space where to generate points
 - Place a fence or select polygon(s) to specify xy areas where to generate points

Echo Extraction Logics

- First possible
 - Looks only at rising start of the return signal
- Last possible
 - Looks only at trailing end of the return signal
- All distinct
 - Constant fraction discriminator
 - More reliable position than other methods
- All possible
 - Gaussian decomposition
 - Can generate multiple points from overlapping signals

Echo Length

- 16 bit signed integer
- Relative length (mm) of return signal compared to typical return from a hard surface
- -50 = echo is 50 mm shorter than typical hard surface return
- +845 = echo is 845 mm longer than typical hard surface return