Outline

- Volume Delay Function: What's New?
- Network Conversion Tools

What's New?

Volume Delay Function (VDF)

Volume Delay Function
Output

$$travel\ time = signal\ delay + freeflow\ time + volume\ delay$$

Function of
- Link Distance
- Speed Limit

Function of
- Link Volume
- Link Capacity per Lane
- Number of Lanes
- Link Type

Volume Delay Function (VDF) Definitions in RTM

	VDF Code RTM3.2 → RTM3.3	RTM3.2	RTM3.3
Special Functions	VDF[1] → VDF[11] Connectors	*SAME*	
	VDF[2] → VDF[12] Bowen Island Ferry	*SAME*	
Merge Functions	VDF[3 to 7] → VDF[13] Highway Merge Sections	$\dfrac{length * 60}{speed} + 0.85 * \left(\dfrac{volume}{(600 \ to \ 1400) * lanes} \right)^5$	$\dfrac{length * 60}{speed} + 0.85 * \left(\dfrac{volume}{capacity * lanes} \right)^5$
Controlled Intersection Functions	VDF[25 to 75] → VDF[14] Stop Sign & Signals	$0.25 + \dfrac{length * 60}{speed} + 0.85 * \left(\dfrac{volume}{(400 \ to \ 1400) * lanes} \right)^4$	$signal\_delay + \dfrac{length * 60}{speed} + 0.85 * \left(\dfrac{volume}{capacity * lanes} \right)^4$
Free-Flow Links	VDF[85] → VDF[15] Free-flow (< 80 km/hr)	$\dfrac{length * 60}{speed} * \left(1 + 0.6 * 0.85 * \left(\dfrac{volume}{1600 * lanes^{1.05}} \right)^5 \right)$	$\dfrac{length * 60}{speed} * \left(1 + 0.6 * 0.85 * \left(\dfrac{volume}{capacity * lanes^{1.05}} \right)^5 \right)$
	VDF[88] → VDF[16] Free-flow (≥ 80 km/hr)	$\dfrac{length * 60}{speed} * \left(1 + 0.6 * 0.43 * \left(\dfrac{volume}{1600 * lanes^{1.05}} \right)^{5.25} \right)$	$\dfrac{length * 60}{speed} * \left(1 + 0.6 * 0.43 * \left(\dfrac{volume}{capacity * lanes^{1.05}} \right)^{5.25} \right)$

Modelling Enhancement

- Calibrate to local conditions:
  - Signal coordination
  - Side street movement is minor
- Technology impact assessment:
  - Connected & autonomous vehicle

Network Conversion Tool

Update Existing RTM3.2 Networks

Network Conversion Tool

1. **Add extra attributes:**
   – signal delay
   – capacity (by time of day)
2. **Compute link capacity**
3. **Map VDF function code**

Option 1:
Scenario VDF Update

1. Init RTM3.3 Emmebank
2. Import RTM3.2 Scenario
3. Run the tool (to update the scenario)

Option 2:
Base Network Text File VDF Update

1. Init RTM3.3 Emmebank
2. Copy base network files to RTM3.3 project folder
3. Run the tool (to update the base network files)

Option 1:
Scenario VDF Update

Scenario VDF Update

1. Init RTM3.3 Emmebank
2. Import RTM3.2 Scenario
3. Run the tool

Steps

1. Navigate to RTM Model Toolbox
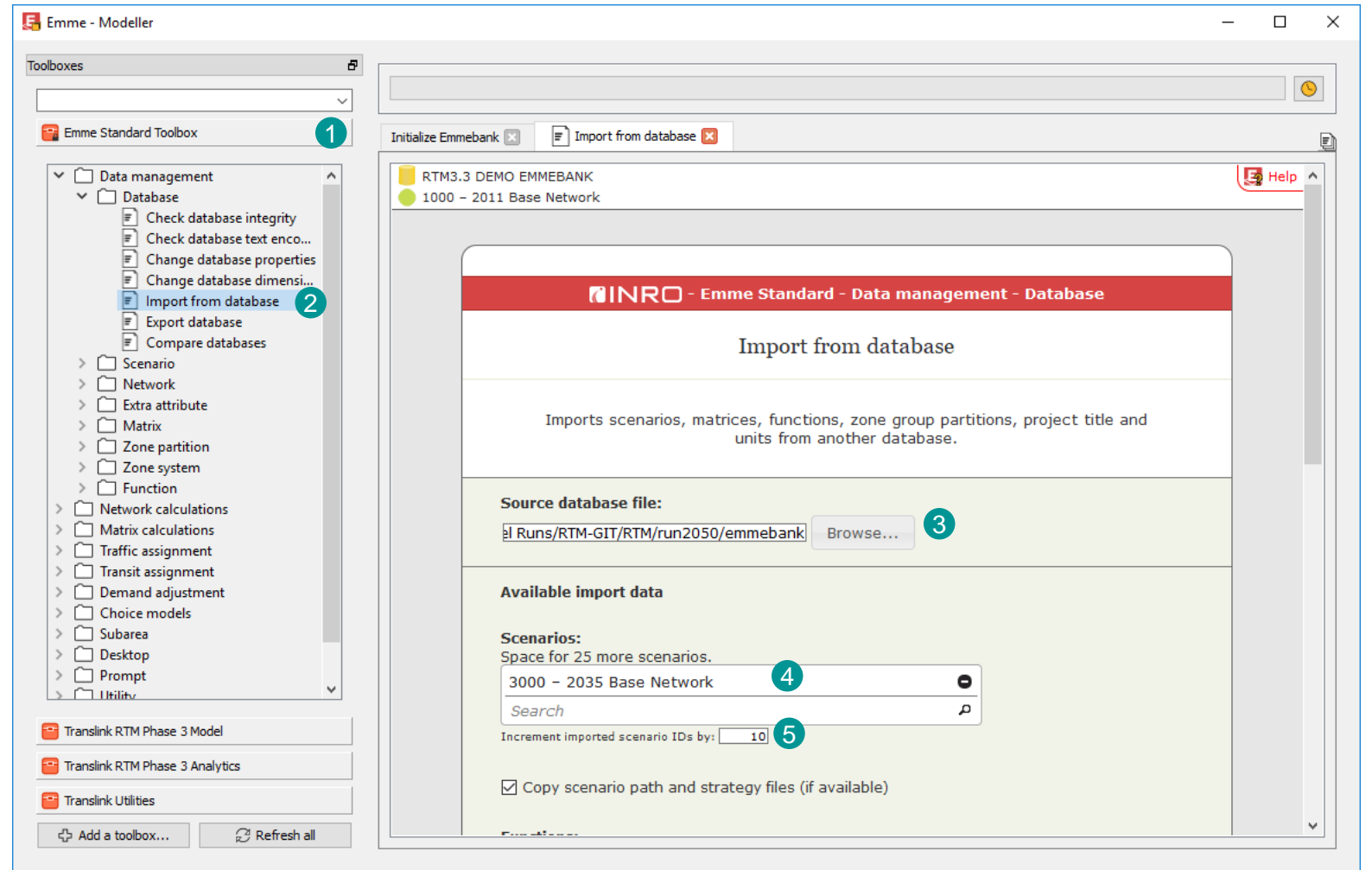2. Launch "*Initialize Emmebank*" Tool
3. Enter Emmebank Name and Run

Scenario VDF Update

1. Init RTM3.3 Emmebank

2. Import RTM3.2 Scenario

3. Run the tool

Steps

① Navigate to Standard Toolbox

② Launch "*Import from database*" Tool

③ Select Source Emmebank file

④ Select RTM3.2 Scenarios

⑤ Enter Increment to Scenario IDs
and Run

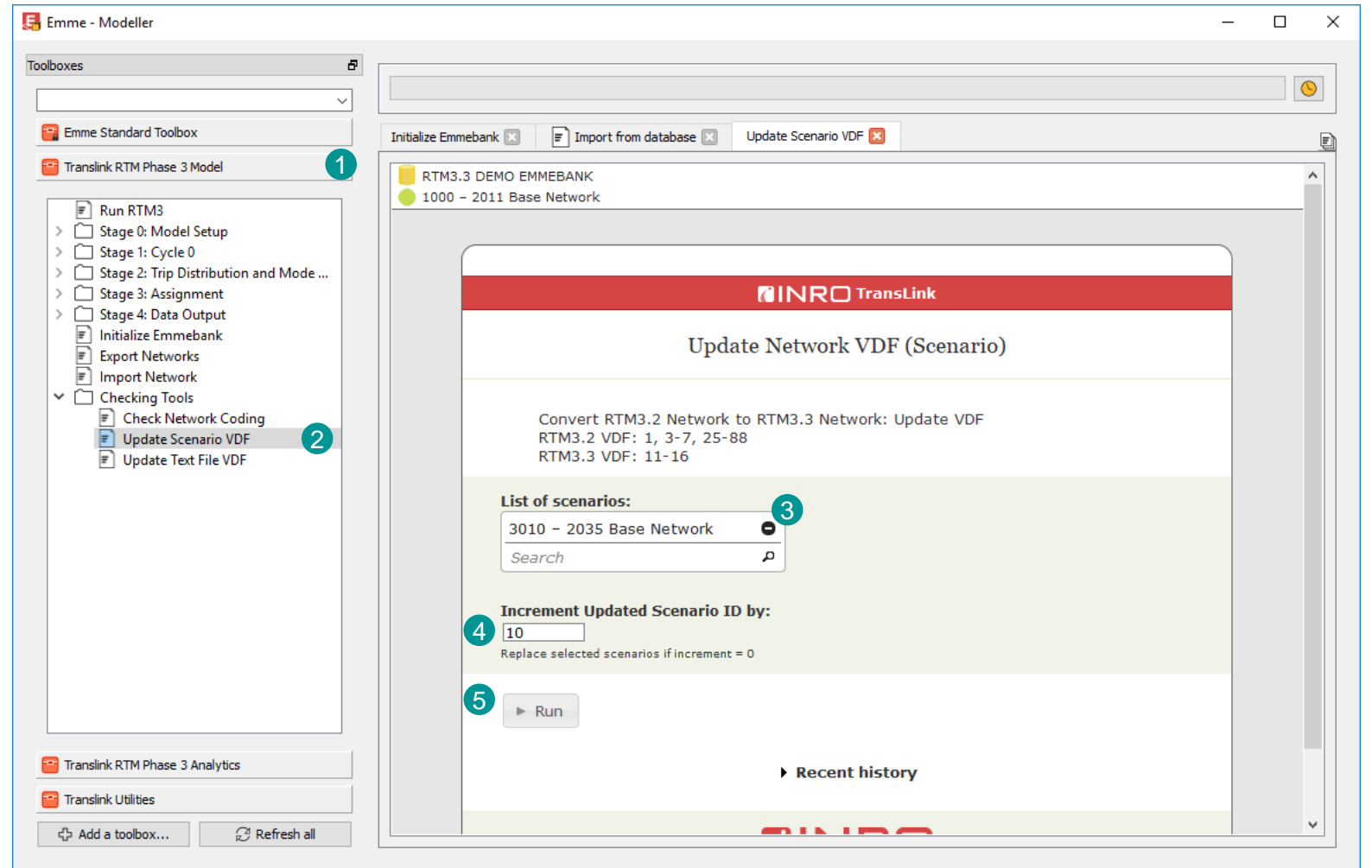# Scenario VDF Update

1. Init RTM3.3 Emmebank

2. Import RTM3.2 Scenario

3. Run the tool

Steps

① Navigate to RTM Toolbox

② Launch "*Update Scenario VDF*" Tool

③ Select RTM3.2 Scenarios

④ Enter Increment to Scenario IDs

⑤ Run

Option 2:
Base Network Text File VDF Update

Base Network Text File VDF Update

1. Init RTM3.3 Emmebank

2. Copy base network files to RTM3.3 project folder

3. Run the tool

Steps

1. Navigate to RTM Model Toolbox
2. Launch "*Initialize Emmebank*" Tool
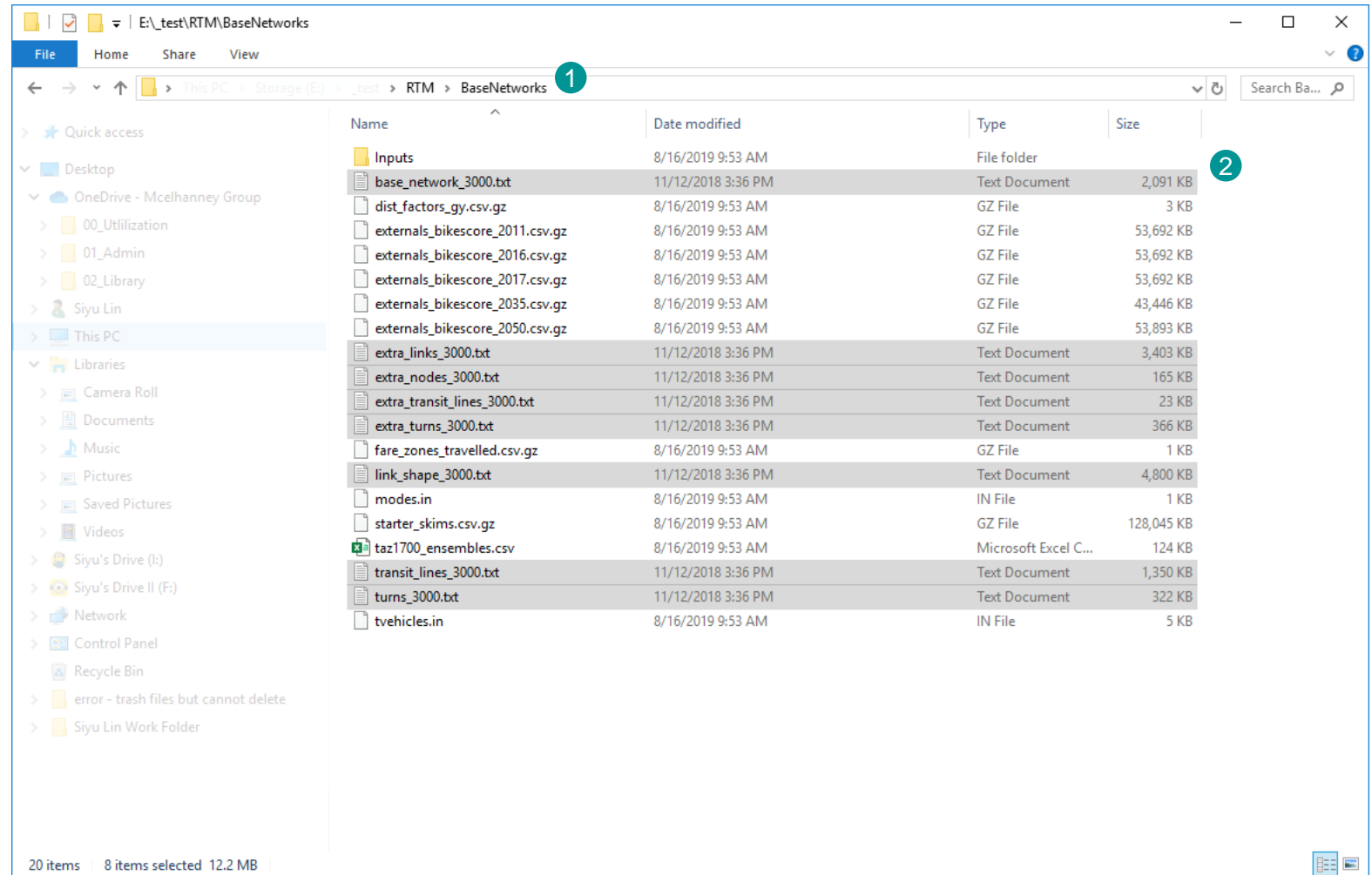3. Enter Emmebank Name and Run

Base Network Text File VDF Update

1. Init RTM3.3 Emmebank

2. Copy base network files to RTM3.3 project folder

3. Run the tool

Steps

① *Open RTM > BaseNetworks* folder

② Copy Base Network Files (8/scenario)
- base_network_####.txt
- extra_links_####.txt
- extra_nodes _####.txt
- extra_transit_lines _####.txt
- extra_turns _####.txt
- link_shape _####.txt
- transit_lines _####.txt
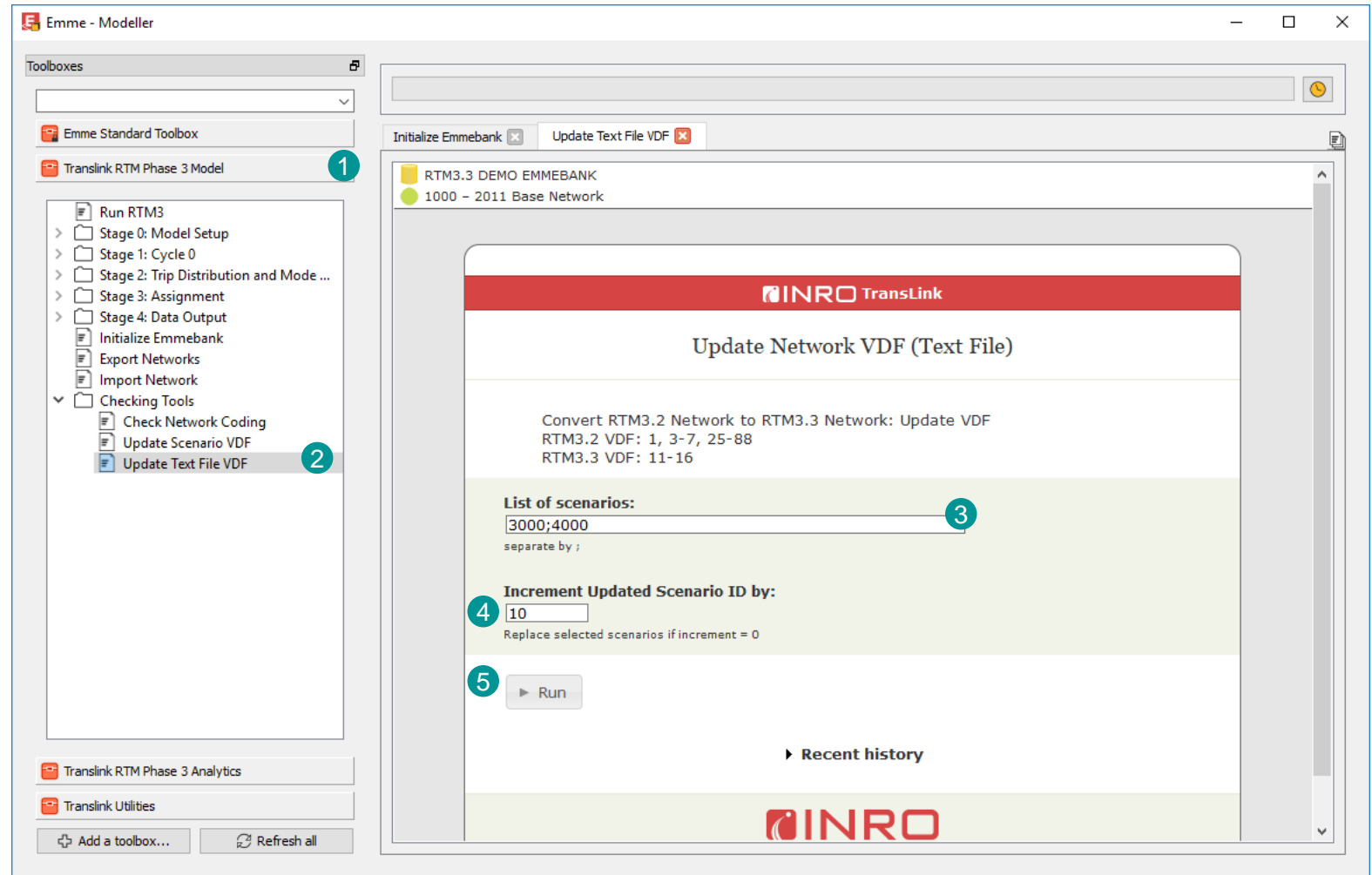- truns _####.txt

Base Network Text File VDF Update

1. Init RTM3.3 Emmebank

2. Copy base network files to RTM3.3 project folder

3. Run the tool

Steps

❶ Navigate to RTM Toolbox

❷ Launch "*Update Scenario VDF*" Tool

❸ Enter Scenario IDs (separated by ;)

❹ Enter Increment to Scenario IDs

❺ Run

Update Existing RTM3.2 Networks

Network Conversion Tool

1. **Add extra attributes:**
   - signal delay
   - capacity (by time of day)
2. **Compute link capacity**
3. **Map VDF function code**

Option 1:
Scenario VDF Update

1. Init RTM3.3 Emmebank

2. Import RTM3.2 Scenario

3. Run the tool (to update the scenario)

Option 2:
Base Network Text File VDF Update

1. Init RTM3.3 Emmebank

2. Copy base network files to RTM3.3 project folder

3. Run the tool (to update the base network files)

VDF Update

1. SIGNAL DELAY AND LINK CAPACITY ARE EXPLICITLY CODED.
2. IMPROVED FORMULATION FOR TRAVEL TIME CALIBRATION.
3. CONVERSION TOOLS UPDATE THE EXISTING NETWORKS.