



TENtec Working Group

9th TENtec working group

25 May 2023

Agenda

TENtec working group meeting

09:30 – 09:40 Opening & Minutes

Mr Eddy Liegeois, Head of Unit, DG MOVE B.1 Transport Networks

09:40 – 10:10 State of play TENtec + Q&A

Future developments

- New TENtec Version
- Automated Exchange of Data

Technical Assistance

- Feedback and Reports received

Feedback from the technical parameter exercise

Mr Mohammadi Laazzouzi, DG MOVE B.1 Transport Networks

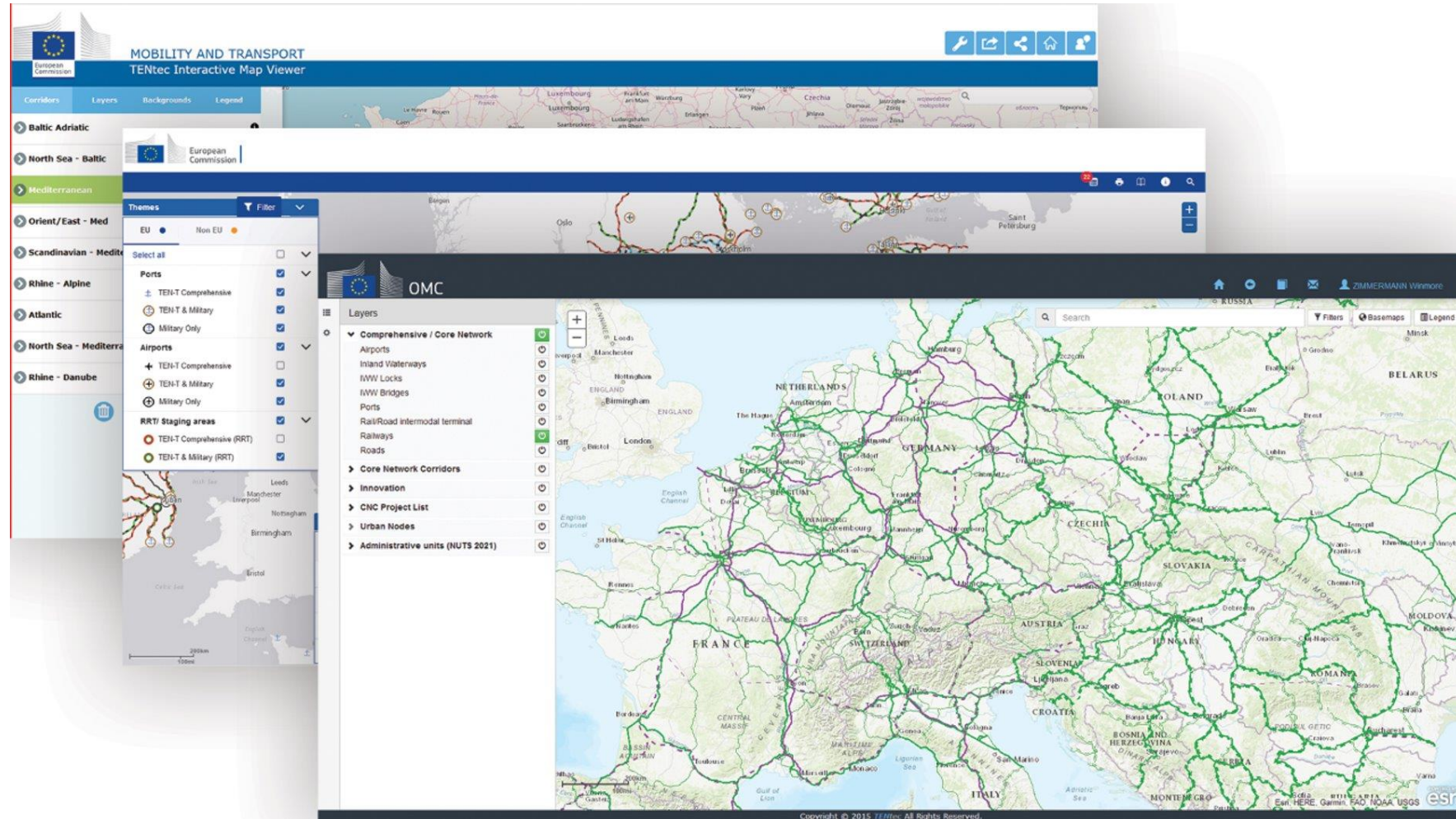
Opening Remarks and Minutes

- Introduction
- Minutes 8th TENtec Working Group
- Revision of Regulation

State of play TENtec + Q&A

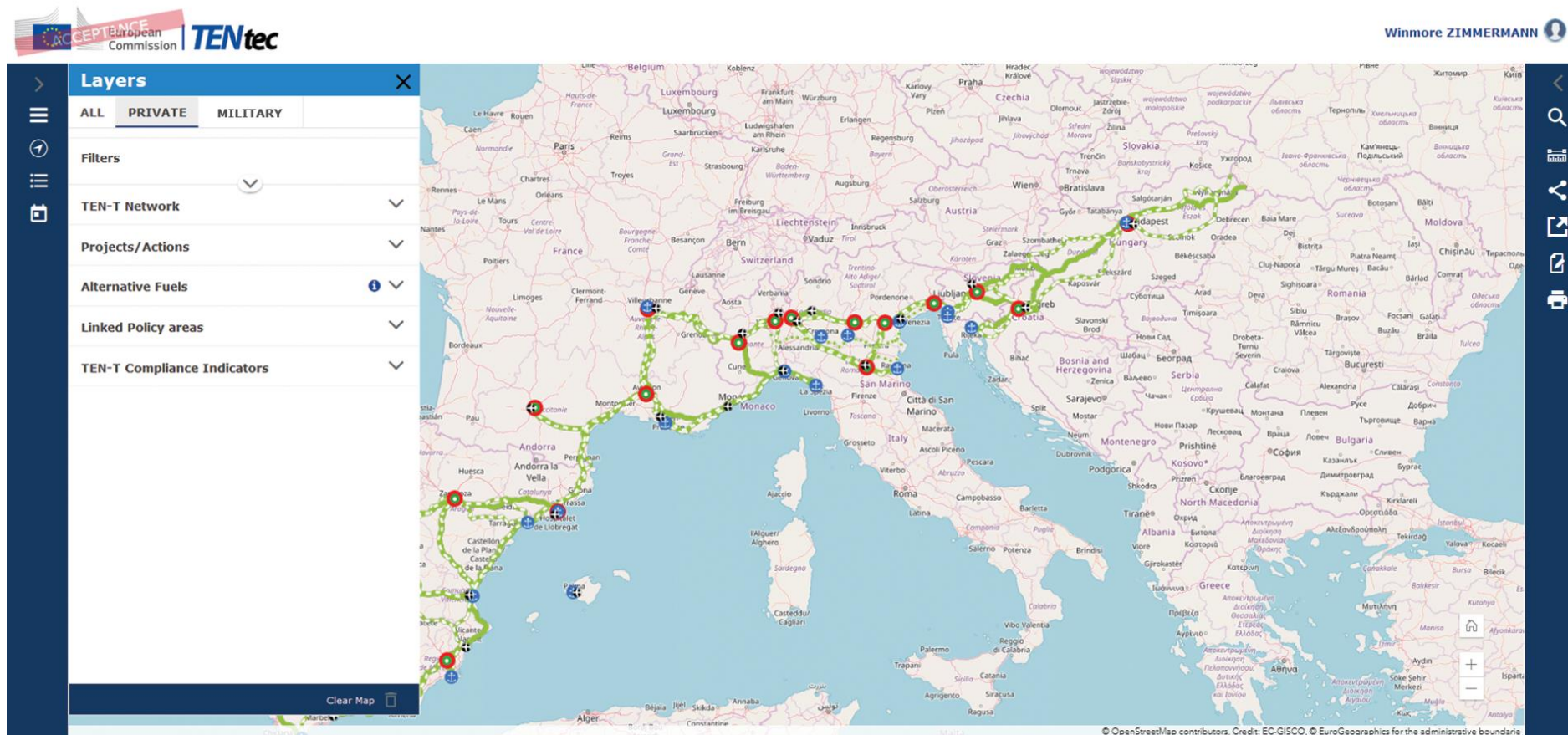
- Future developments
- Technical Assistance
- Feedback from the technical parameter exercise

Future developments – New TENtec version (1)



Future developments – New TENtec version (2)

Basic version of Single TENtec Viewer



Automated Exchange of Data

- **Objective**

High-quality transport infrastructure related data to support the TEN-T policy and to monitor the TEN-T compliance across transport modes.

- **Challenge**

Data collection and validation difficult, due to the multitude and complexity of the numerous national and EU databases and information systems.

- **Guiding Concept**

“Once-Only” principle to reduce the administrative burden on Member States by asking the same information only once.

- **Solution**

Automated data exchange solutions to connect TENtec with data sources at Member State and EU level.

Technical Assistance

"One-Off" financial support to Member States for the development of automated data exchange solutions with TENtec.



- 20 Member States applied for CEF technical assistance
- 9 Member States delivered "phase 1 report"
- 4 Member States overdue with the delivery of "phase 1 report"

Technical Parameters – State of Play

- **Work in progress**

Preliminary list of parameters is subject to changes, based on the final text of the new TEN-T regulation and will be validated within the TENtec working group.

- **First input from Member States**

Comments/remarks on the technical parameters have been reviewed and discussed internally when drafting the latest list of parameters.

- **New categorisation of parameters introduced**

Based on internal reflections and your suggestions, four types of technical parameter categories have been identified to streamline the data collection.

- **Frequency & Automatisation**

More flexible update frequencies and automatisation requirements, depending on the parameter and category.

Technical Parameters – Categories

No.	Category	Definition
1	TEN-T Regulation	Essential parameters, based on the TEN-T standards, as required by the TEN-T regulation.
2	Basic	Important parameters to support other transport policy related areas.
3	Extended	Secondary parameters which can be provided on a voluntary basis.
4	Database attributes	Technical network characteristics, which form the network and will mostly remain stable.

Technical Parameters – New TEN-T Regulation (1)

New technical parameters expected to be monitored (under reserve)

- **Railways**

- Loading gauge (Combined transport profile for semi-trailers)
- ≥ 160 km/h design speed (core and extended core passenger lines)
- Number of freight trains per hour on a single track
- Number of freight trains per hour on a double track

- **Inland Waterways**

- Good navigation status (Number of days per year with reference water levels met)

Technical Parameters – New TEN-T Regulation (2)

New technical parameters expected to be monitored (under reserve)

- **Roads**

- **Separation of road carriageways** for the two directions of traffic by a dividing strip not intended for traffic
- **Roads do not cross** at grade with any road, railway or tramway track, bicycle path or footpath
- **Availability of rest areas** at a max. distance of 60 km from each other
- **Availability of safe and secure parking areas** for commercial vehicles at a maximum distance of 100 km from each other
- **Installation of weigh in motion** at a maximum distance of 300 km from each other

Technical Parameters – New TEN-T Regulation (3)

New technical parameters expected to be monitored (under reserve)

- **Maritime Ports**

- Energy Hub related parameters (e.g. hydrogen production and infrastructure)
- Availability of alternative fuels bunkering
- On shore power supply
- Waste reception facilities

- **Airports**

- Air transport infrastructure provides for pre-conditioned air supply to stationary aircraft

- **Multimodal freight terminals**

- Capability of handling intermodal units
- Ability to accommodate 740m long trains without manipulation

Technical Parameters – Next Steps

Further assessment and internal discussion with internal services (e.g. EUROSTAT)

- Rail: European Railways Agency (ERA) on the railways related parameters in RINF.
 - Objective: All TEN-T relevant parameters should be collected through RINF.
- Inland Waterways: EuRIS on the inland waterways related parameters.
 - Objective: All TEN-T relevant parameters for EuRIS Member States should be retrieved through EuRIS, therefore, it is important that EuRIS implements a TEN-T attribute in their database.
- Roads: Conference of European Directors of Roads (CEDR) on the roads related parameters in terms of data availability.

Another feedback round planned for Q3/4 2023 with Member States before the adoption of the TEN-T regulation.



General Technical Workshop TENtec AED

Part 2 of today's meeting

A guide on which next steps to take

25 May 2023

Introduction and agenda

10:10 – 10:20	Introduction Mr Adam Barta / Mr Satish Adabala SRD.2 DG MOVE/DG ENER
10:20 – 11:00	Presentation of the proposed API solution + Q&A Mr Fabio Vasconcelos, SRD.2 DG MOVE/DG ENER
11:00 – 11:30	<ul style="list-style-type: none">• Feedback from the technical meetings and presentation of test cases• Scenarios and Data flows• Pre-requisites for connecting to TENtec• Program plan Mr Winmore Zimmermann, SRD.2 DG MOVE/DG ENER Mr Vitor Carvalho, SRD.2 DG MOVE/DG ENER Mr Fabio Vasconcelos, SRD.2 DG MOVE/DG ENER
11:30 – 12:30	Open discussion
12:30 – 13:00	Conclusions and next steps

Introduction

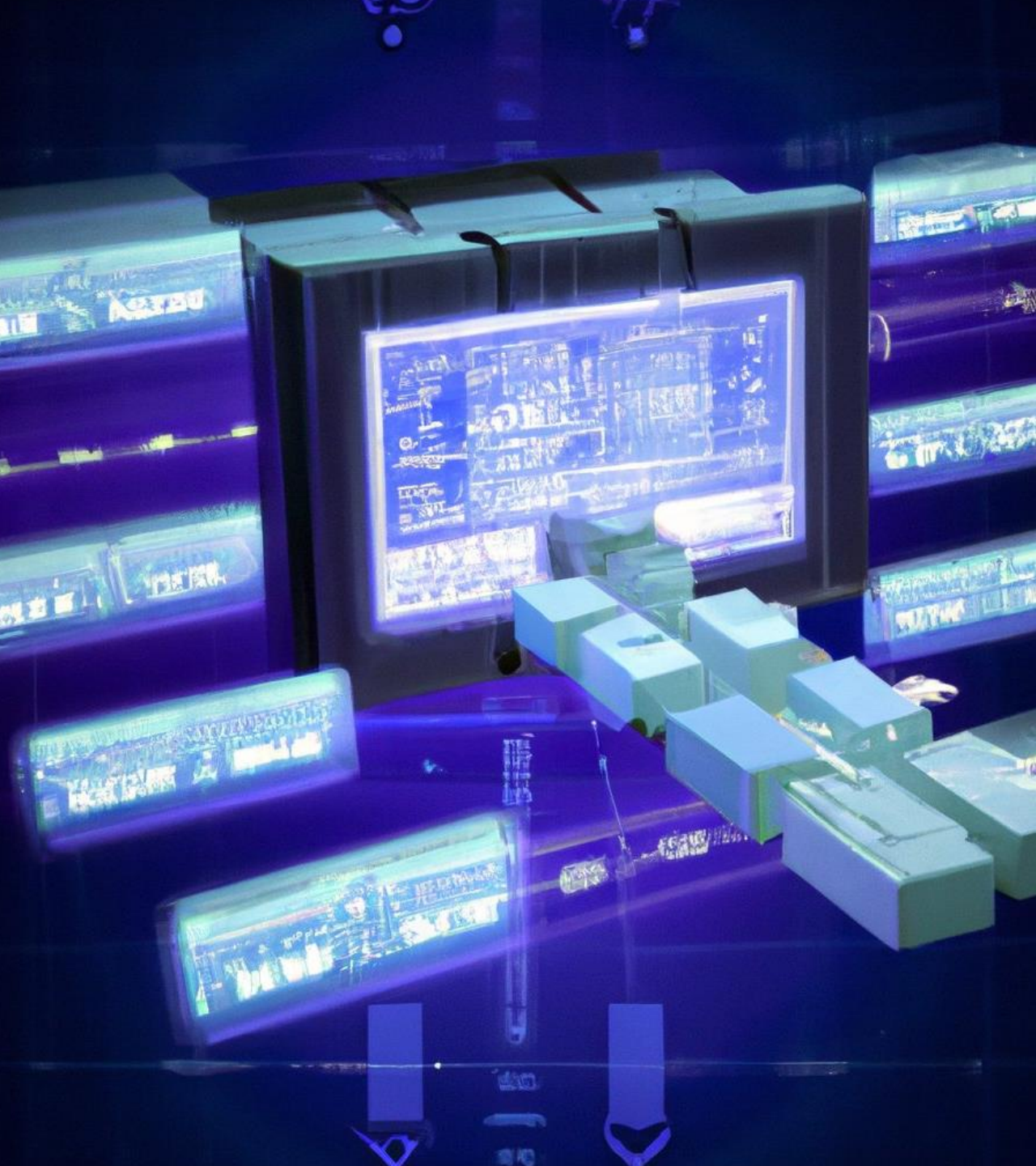
- Automated exchange of data
- Web Services and demo
- Current collaboration with Data Source Providers (DSP)
- Pre-requisites for connecting to TENtec
- Program plan
- TENtec Single Viewer



Presentation of the proposed API solution + Q&A

What do you get from us?

May 2023



Automated Exchange of Data (Technical view)

- Introduction
- What is it about? What have we done so far. What do we need from you? What will you get from us?

DEMO



The Technical Specification DRAFT (01) is available



Connections between the systems



Queries and responses

Get sections and parameters for control
Send data updates to TENtec



Information and documentation

Automated Exchange of Data (AED) – What it is about!



Utilize automated data exchange and sharing of data to its full potential to streamline administrative tasks and enhance TENtec.



Use the "once-only" principle to speed up the process of retrieving high-quality data about transportation infrastructure in the ecosystem.



By integrating supplementary reporting requirements from Member States and EU organizations, a holistic approach is necessary.

What we need from you

- Teamwork is crucial for facilitating data exchange and the efficient sharing of knowledge regarding transport infrastructure.
- With your assistance, we can continue making the significant gains we've already accomplished.
- We need your patience, co-operation, and efforts from now on. We'll work hard to make this project a success in exchange for your help.
- You must build the tool to connect your systems to TENtec system



Feedback from the technical meetings and presentation of test cases

Current tests with Member States data/geometry with our technical team

Current collaboration with Data Source Providers (DSP) and required parameters

Case studies with GIS Team

- Proposals way of working with data – Phase 1

Test Cases

- Data provided by members
- Exercise carried out to align data
- Results after exercise will be discussed
 - Sweden
 - Netherlands, France (EuRIS)
 - ERA/RINF

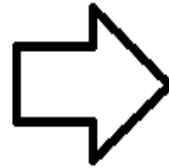
Method 1: Parameters based on TENtec-ID

- Step 1:
 - Analyze the content received,
 - Split it by transport mode, by parameter and reference year.
- Step 2:
 - Load the data to the correct parameter event layer
- Step 3:
 - Analyse and publish results

Method 1: Parameters based on TENtec-ID

```
{
  "json_featuretype" : "Road_Speedlimit",
  "Section_id" : "64535",
  "Reference_Year" : "2023",
  "Parameter_name" : "Design speed (km/h)",
  "Parameter_id" : "1",
  "Parameter_value" : "100",
  "Parameter_source" : "SE-NVDB",
  "Start_measure" : "0",
  "End_measure" : "183.52270008189035"
},
{
```

```
  "json_featuretype" : "Road_Speedlimit",
  "Section_id" : "64535",
  "Reference_Year" : "2023",
  "Parameter_name" : "Design speed (km/h)",
  "Parameter_id" : "1",
  "Parameter_value" : "100",
  "Parameter_source" : "SE-NVDB",
  "Start_measure" : "183.52270008189035",
  "End_measure" : "1824.0591954813067"
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{
```



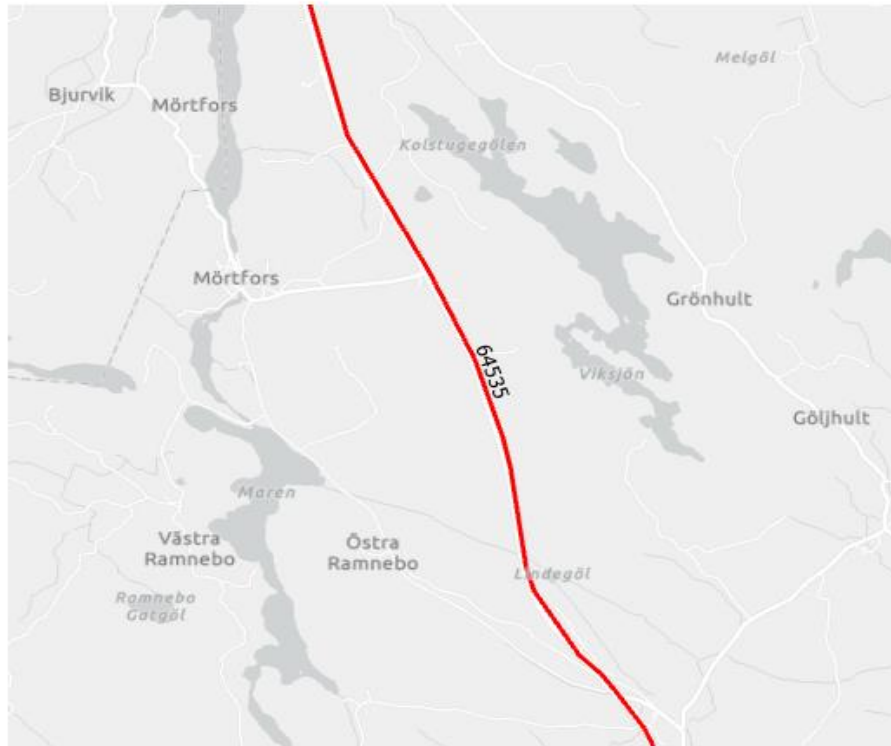
```
  "json_featuretype" : "Road_Speedlimit",
  "Section_id" : "64535",
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  "Parameter_name" : "Design speed (km/h)",
  "Parameter_id" : "1",
  "Parameter_value" : "100",
  "Parameter_source" : "SE-NVDB",
  "Start_measure" : "1824.0591954813067",
  "End_measure" : "1904.6397735045018"
},
{
```

```
  "json_featuretype" : "Road_Speedlimit",
  "Section_id" : "64535",
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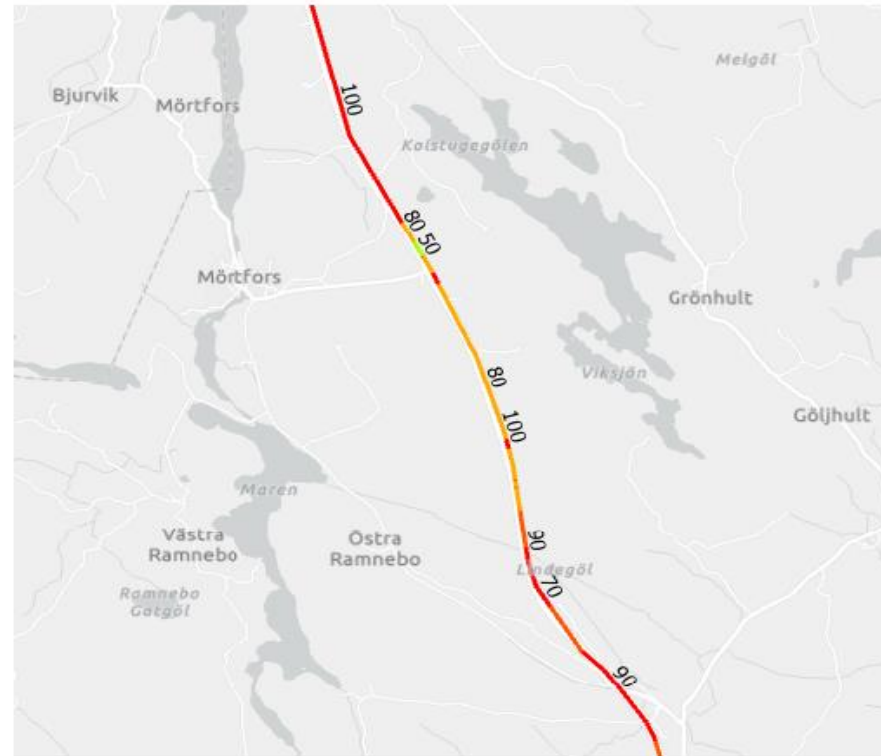
Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy Rows: Insert v							
ROUTENAME	FROMMEASURE	TOMEASURE	PARAM_YEAR	PARAM_ID	PARAM_NAME	PARAM_VALUE	PARAM_SOURCE
64535	0	183.5227	2023	53	Design speed (km/h)	100	SE-NVDB
64535	183.5227	1824.059195	2023	53	Design speed (km/h)	100	SE-NVDB
64535	1824.059195	1904.639774	2023	53	Design speed (km/h)	100	SE-NVDB
64535	1904.639774	3770.347437	2023	53	Design speed (km/h)	100	SE-NVDB
64535	3770.347437	4072.753151	2023	53	Design speed (km/h)	100	SE-NVDB
64535	4072.753151	4223.286085	2023	53	Design speed (km/h)	100	SE-NVDB

Method 1: Parameters based on TENtec-ID

Roads_GL2017 (TEN-T Network)



Roads_GL2017_053 (Event Layer for Design Speed (km/h))

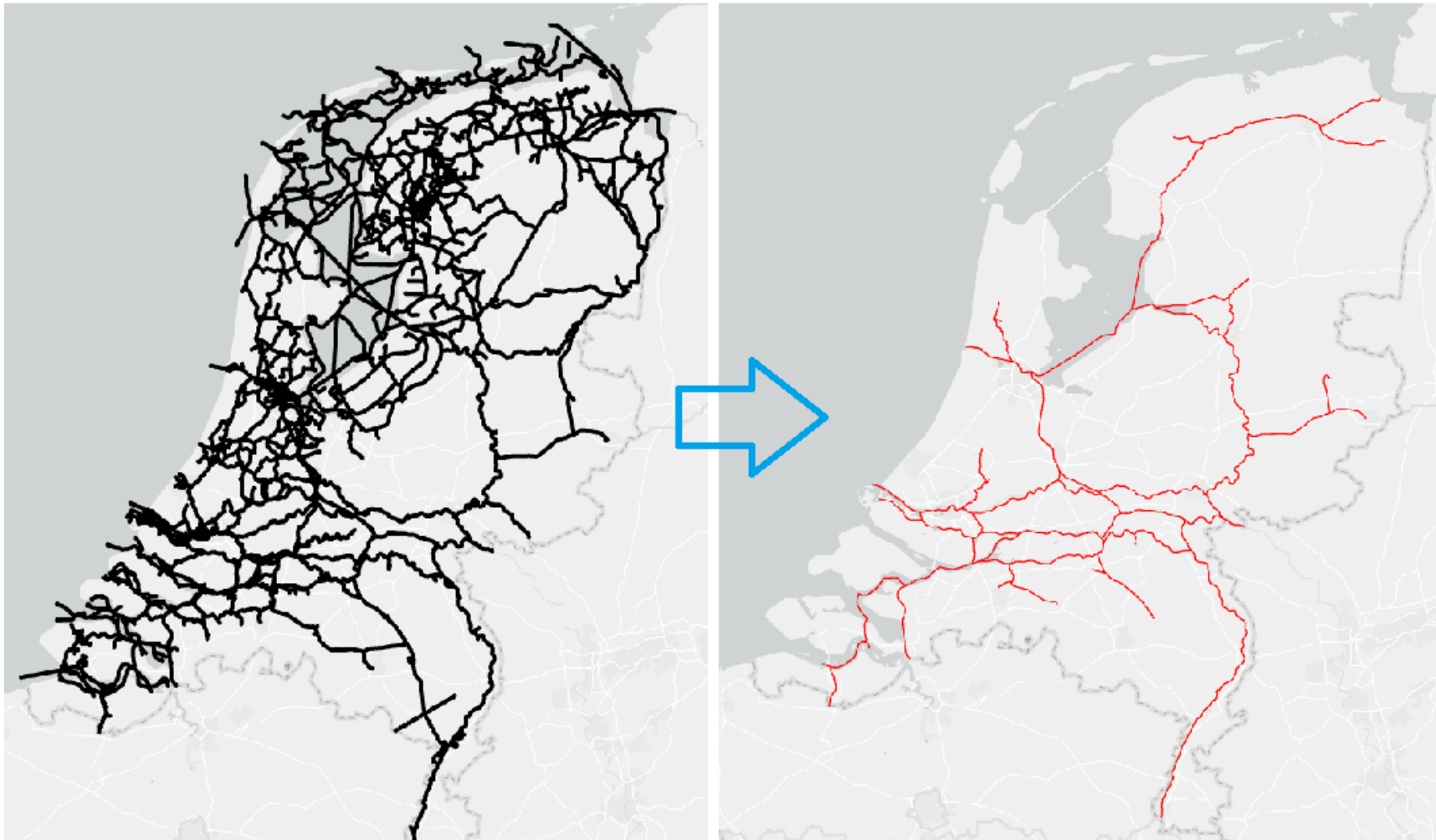


Method 2: Parameters based on External-ID

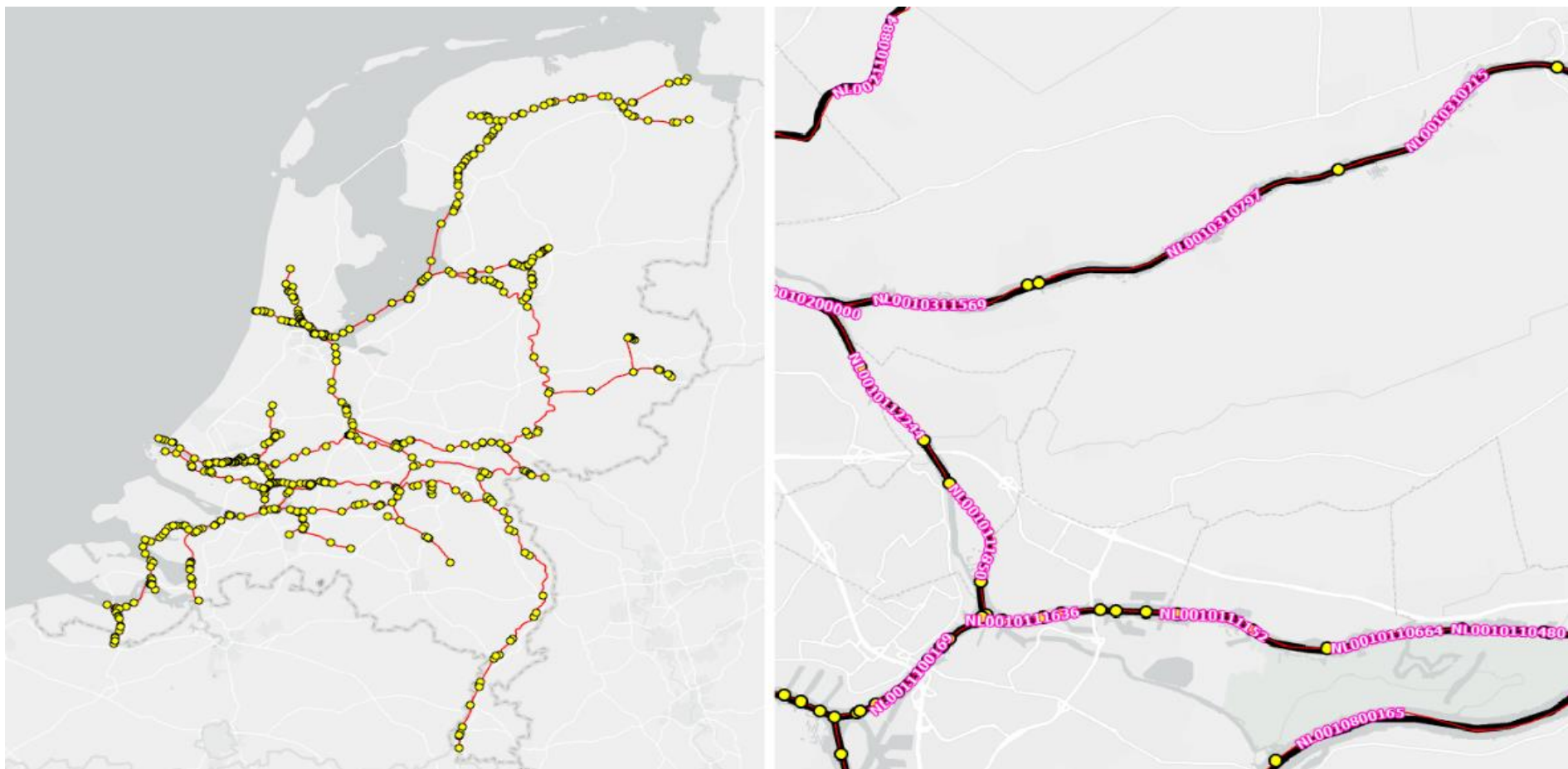
- Step 1: Create one event layer with the external ID's to make the translation between the TENT network and the External network.
- Step 2: Analyze the contents received and translate it to the TENT network using the event layer with the external ID's.
- Step 3: Load the data to the correct parameter event layer.

Method 2: Parameters based on External-ID

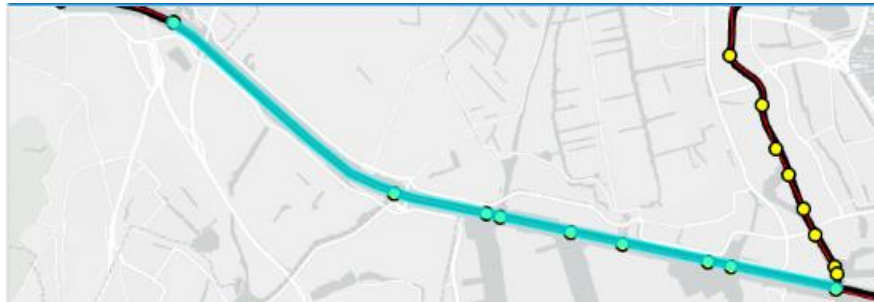
TEN-T Flag in MS Networks



Method 2: Parameters based on External-ID



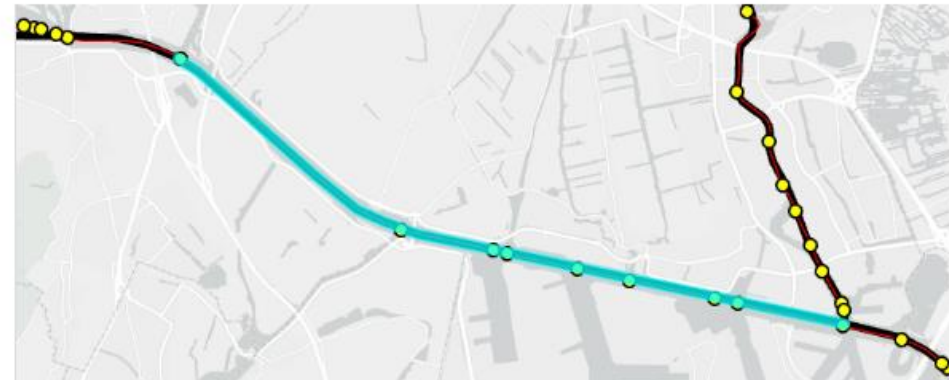
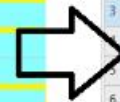
Method 2: Parameters based on External ID's



1:130,912 4.6968316°E 52.4239751°N

FairWay_PNT_LF02_1k

	OBJECTID *	RID	MEAS	Distance	code *	TYPE	STATUS
1	151	15255	84.842551	47.106135	NL0023300278	START	1
2	712	15255	84.842551	47.106135	NL0023300063	END	<Null>
3	49	15255	8426.5407	-46.647415	NL0023300788	START	1
4	682	15255	8426.5407	-46.647415	NL0023300278	END	1
5	6	15255	11261.134433	-17.25925	NL0023300961	START	1
6	578	15255	11261.134433	-17.25925	NL0023300788	END	1
7	12	15255	11694.362863	-24.145724	NL0023300987	START	1
8	535	15255	11694.362863	-24.145724	NL0023300961	END	1
9	330	15255	13835.702428	-45.888602	NL0023301118	START	1
10	541	15255	13835.702428	-45.888602	NL0023300987	END	1
11	170	15255	15449.492777	-48.550277	NL0023301217	START	1
12	857	15255	15449.492777	-48.550277	NL0023301118	END	1
13	184	15255	18058.406596	-50.280114	NL0023301376	START	1
14	701	15255	18058.406596	-50.280114	NL0023301217	END	1
15	138	15255	18758.358302	-50.502123	NL0023301419	START	1
16	713	15255	18758.358302	-50.502123	NL0023301376	END	1
17	234	15255	21971.900348	-70.722941	NL0023301615	START	<Null>
18	544	15255	21971.900348	-70.722941	NL0023300000	START	<Null>

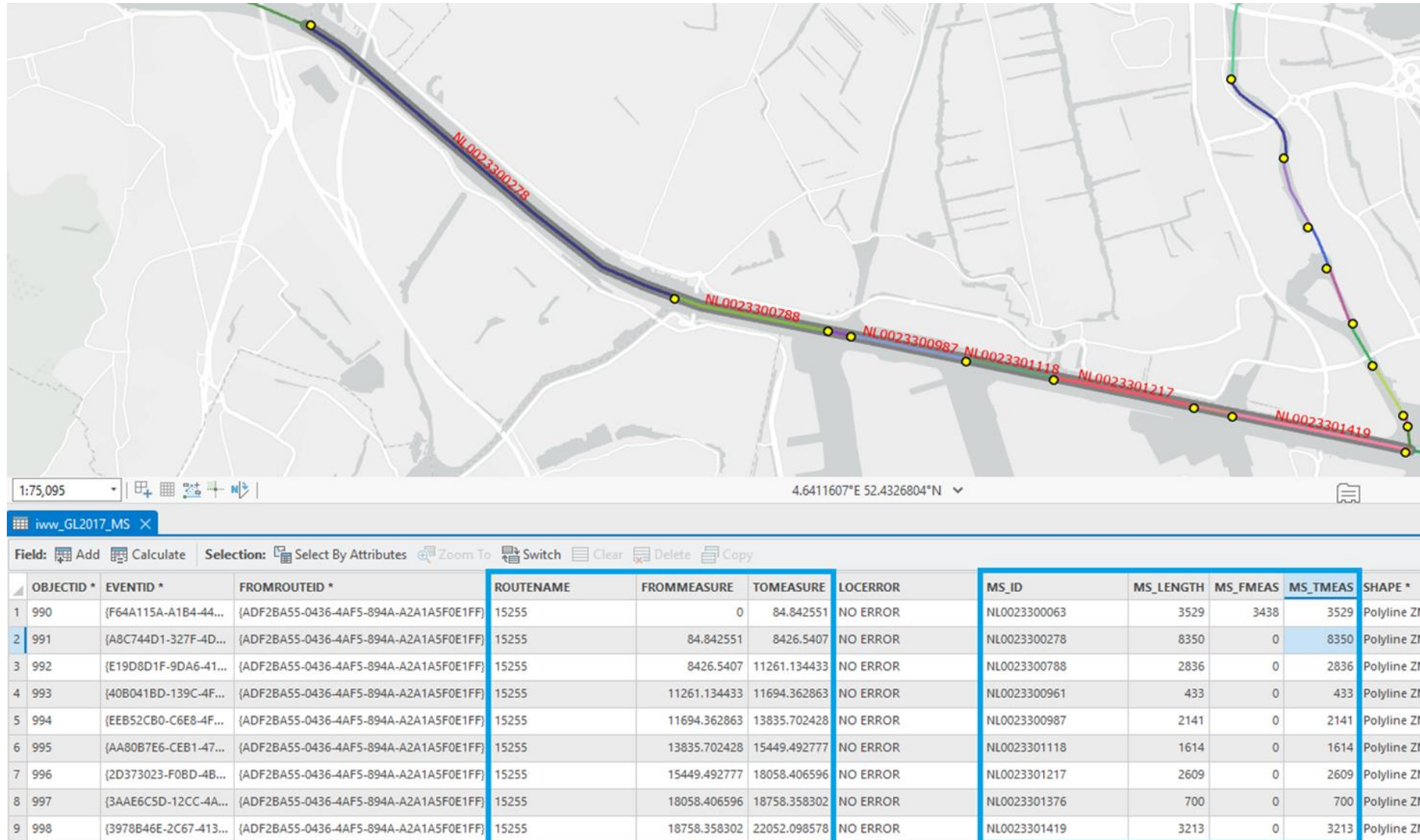


1:130,912 4.7466158°E 52.4150562°N

FairWay_PNT_LF02_1k EVENT_TABLE_03_ExcelToTable

	OBJECTID *	OBJECTID	RID	FMEAS	TMEAS	CODE	TYPE	NETWORK_LENGTH
1	279	136	15255	0	84.842551	NL0023300063	START	22052.098578
2	280	128	15255	84.842551	8426.5407	NL0023300278	START	22052.098578
3	281	126	15255	8426.5407	11261.134433	NL0023300788	START	22052.098578
4	282	124	15255	11261.134433	11694.362863	NL0023300961	START	22052.098578
5	283	125	15255	11694.362863	13835.702428	NL0023300987	START	22052.098578
6	284	135	15255	13835.702428	15449.492777	NL0023301118	START	22052.098578
7	285	129	15255	15449.492777	18058.406596	NL0023301217	START	22052.098578
8	286	130	15255	18058.406596	18758.358302	NL0023301376	START	22052.098578
9	287	127	15255	18758.358302	21971.900348	NL0023301419	START	22052.098578
10	288	132	15255	21071.623999	21801.649272	NL0023600042	START	22052.098578
11	289	133	15255	21801.649272	21910.813201	NL0023600029	START	22052.098578
12	290	134	15255	21910.813201	21971.900348	NL0023600000	START	22052.098578
13	291	131	15255	21971.900348	22052.0986	NL0023301615	START	22052.098578

Method 2: Parameters based on External Id



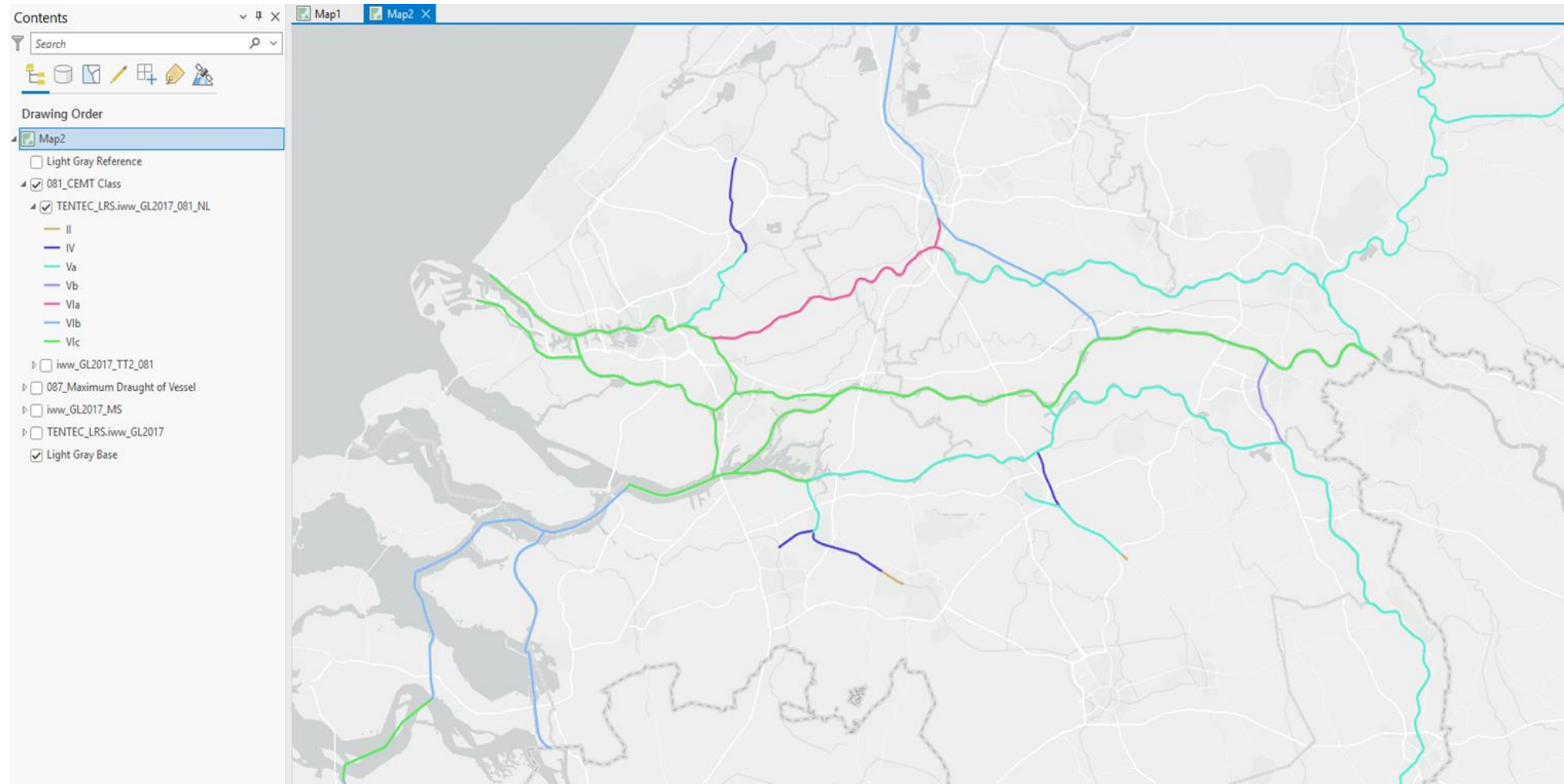
Method 2: Parameters based on External-ID

- Step 2 and 3:

Field: Add Calculate Selection: Select By Attributes Switch Clear Delete Copy Rows: Insert								
	MS_ID	FROMMEAS...	TOMEASURE	PARAM_YEAR	PARAM_ID	PARAM_NAME	PARAM_VALUE	PARAM_SOURCE
1	NL0006000388			2023	81	CEMT class	Va	VIN
2	NL0006000730			2023	81	CEMT class	Va	VIN
3	NL0006000747			2023	81	CEMT class	Va	VIN
4	NL0006002261			2023	81	CEMT class	Va	VIN
5	NL0006002287			2023	81	CEMT class	Va	VIN
6	NL0006002655			2023	81	CEMT class	Va	VIN
7	NL0006002809			2023	81	CEMT class	Va	VIN
8	NL0006002931			2023	81	CEMT class	Va	VIN
9	NL0006003384			2023	81	CEMT class	Va	VIN
10	NL0006003560			2023	81	CEMT class	Va	VIN
11	NL0006004269			2023	81	CEMT class	Va	VIN
12	NL0006004393			2023	81	CEMT class	Va	VIN
13	NL0006004703			2023	81	CEMT class	Va	VIN

dd Calculate Selection: Select By Attributes Switch Clear Delete Copy Rows: Insert								
D *	TENT_ID	FROMMEASURE	TOMEASURE	PARAM_YEAR	PARAM_ID	PARAM_NAME	PARAM_VALUE	PARAM_SOURCE
	150316143228535	0	5138.50201176	2023	81	CEMT class	Va	VIN
	150316143228535	5138.50201176	5300.64342533	2023	81	CEMT class	Va	VIN
	150316143228535	5300.64342533	9819.99029793	2023	81	CEMT class	Va	VIN
	150316143228535	9819.99029793	11624.19611432	2023	81	CEMT class	Va	VIN
	150316143228535	11624.19611432	12380.9807	2023	81	CEMT class	Va	VIN

Method 2: Parameters based on External-ID



Conclusions

Both Options of sending data were utilized, (Options 1,2,3)

- The options are described in the [TENtec - Automatic Exchange of Parameters \(AEP\)-guide-DRAFT-02](#)

Some achieve the desired results with adequate effort more than other methods

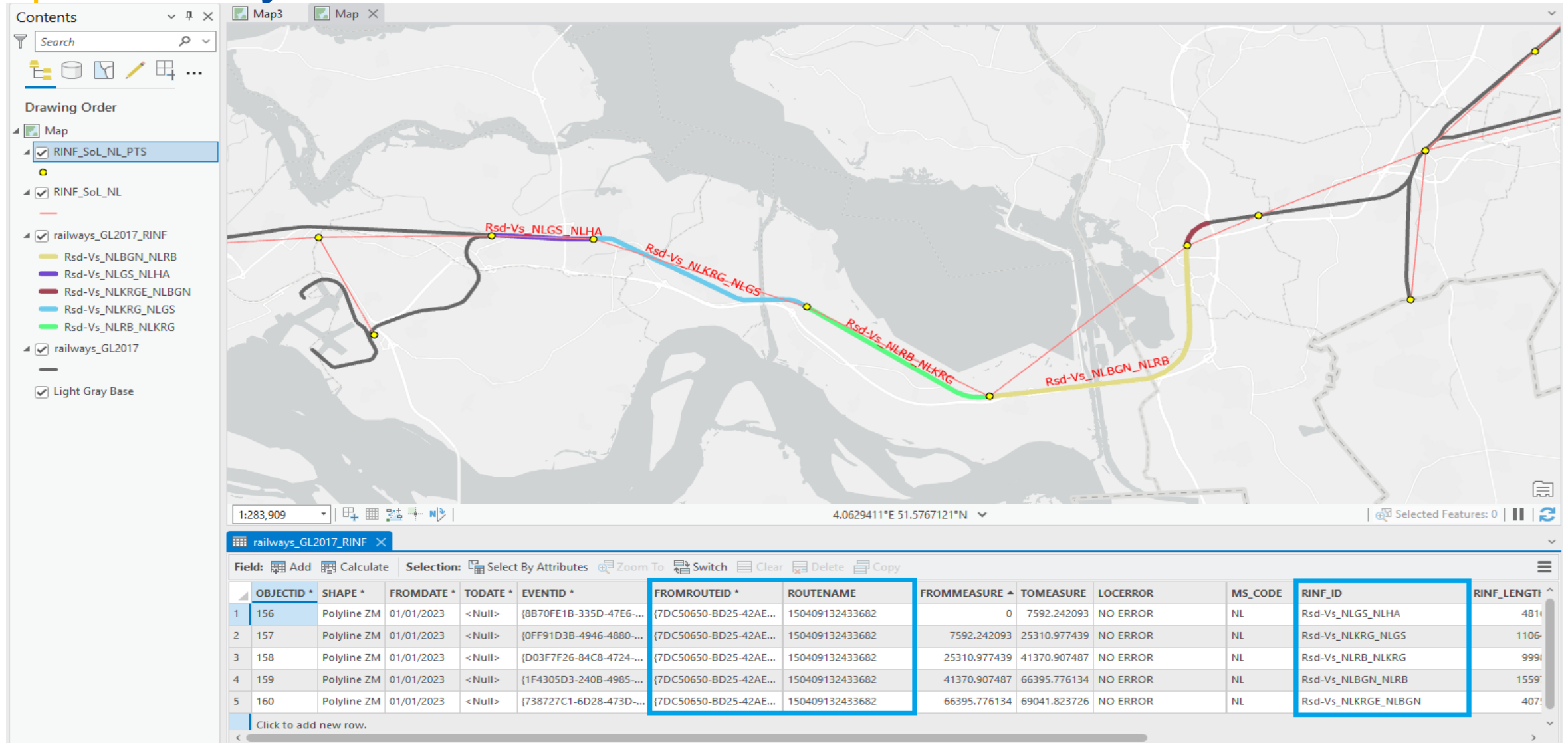
Options favored to be discussed by the pilot group



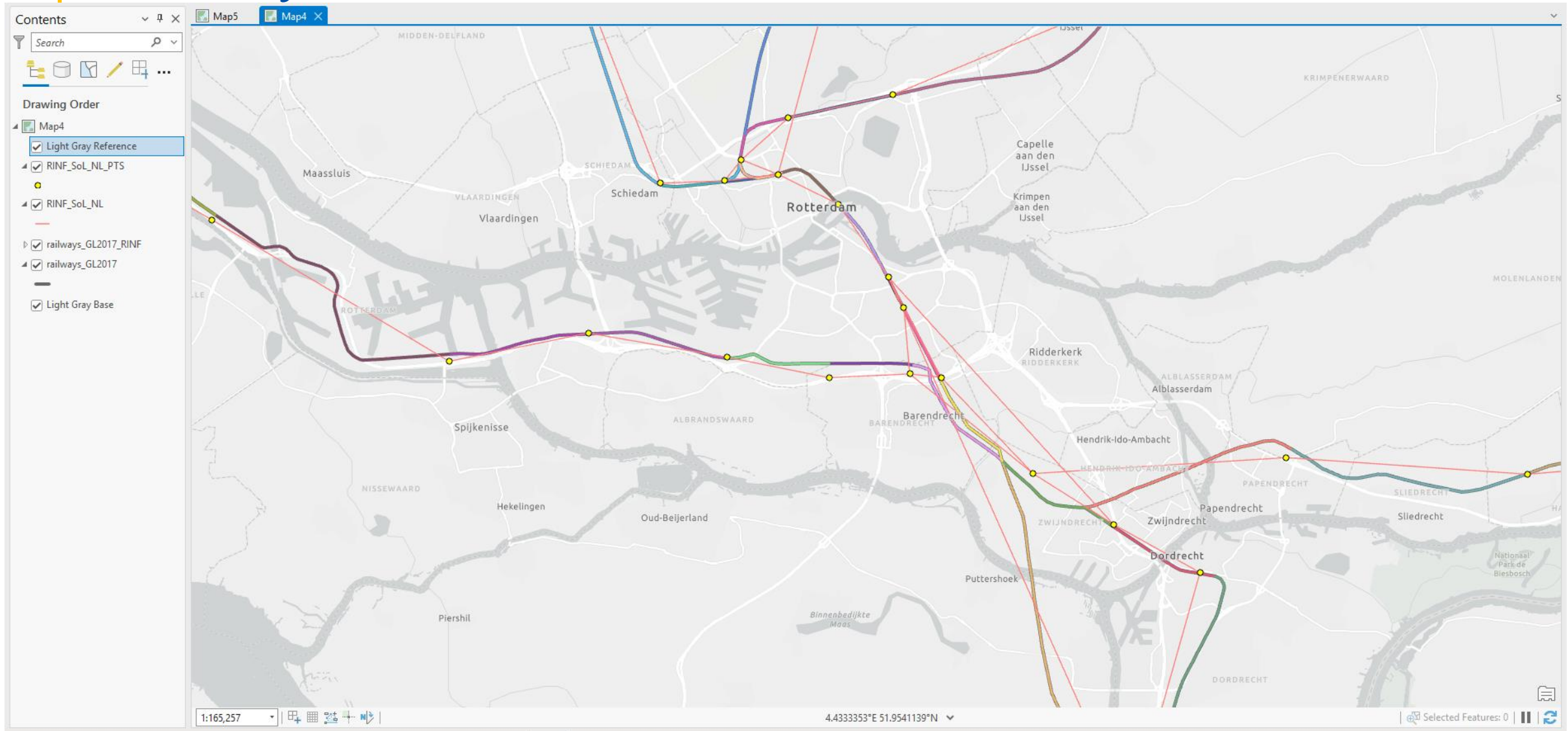
RINF/ERA

- Collaboration is being carried out
- Some of the results:

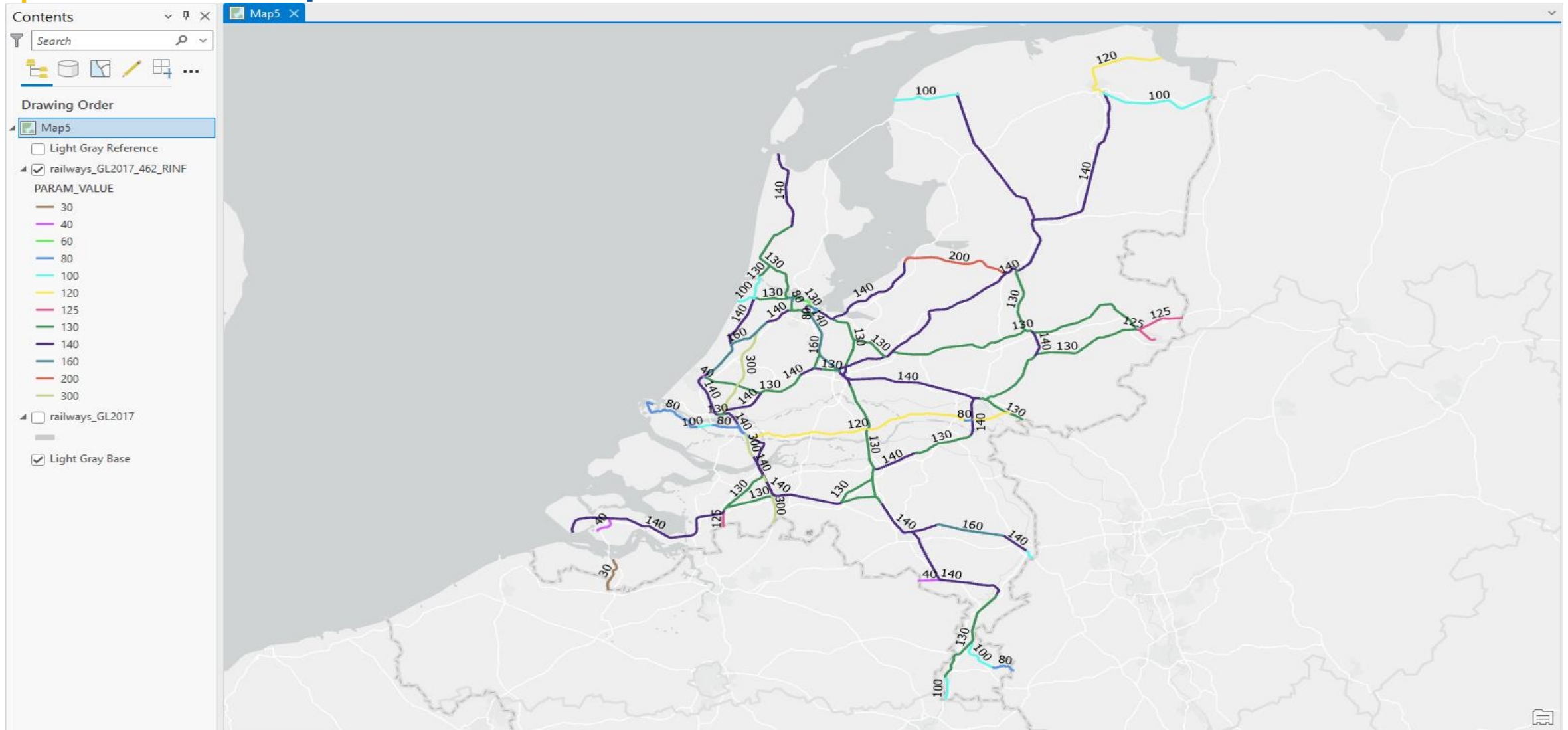
Railways - Parameters from RINF



Railways - Parameters from RINF



RINF - Speed



Issues

The following issues should be taken into consideration.

- Complexity of straight lines versus correct way in RINF
 - GIS can link it
- Difficulty in finding which parameter to use
- Using combination of RINF values in order to extract MS data into TENtec servers
- Some work needs to be done by MS to enter the correct TRACK

Recommendations.

- TEN-T sections should be flagged in operational transport network
- TEN-T section data must match your network, so that the TEN-T network can have accurate data
- You can request data for testing for a small area
- You can also request a shapefile

Conclusions from the tests

- Issues with RINF (ERA) are being discussed
- The importance of the work is to make sure all TEN-T required parameters are available in the data provided, from the Member States
- The Member States must provide the TEN-T definition to RINF such as track-id for the track belonging to TENtec.
- Some work needs to be from MS to input the required information
 - Member State is the true owner of the data
- You are welcome to request shapefiles from GIS Team to match TEN-T and your network

Current collaborations (Streams)



With the help of the TENtec GIS team, Member States are validating their data for data integration and matching.



Progress is being made on the ERA/RINF collaboration.



A Proof of Concept for Web Services is being tested with a few selected countries.



Initiatives from EURIS that will be carefully analyzed for incorporation in the future.

Q&A

TENtec Web Services

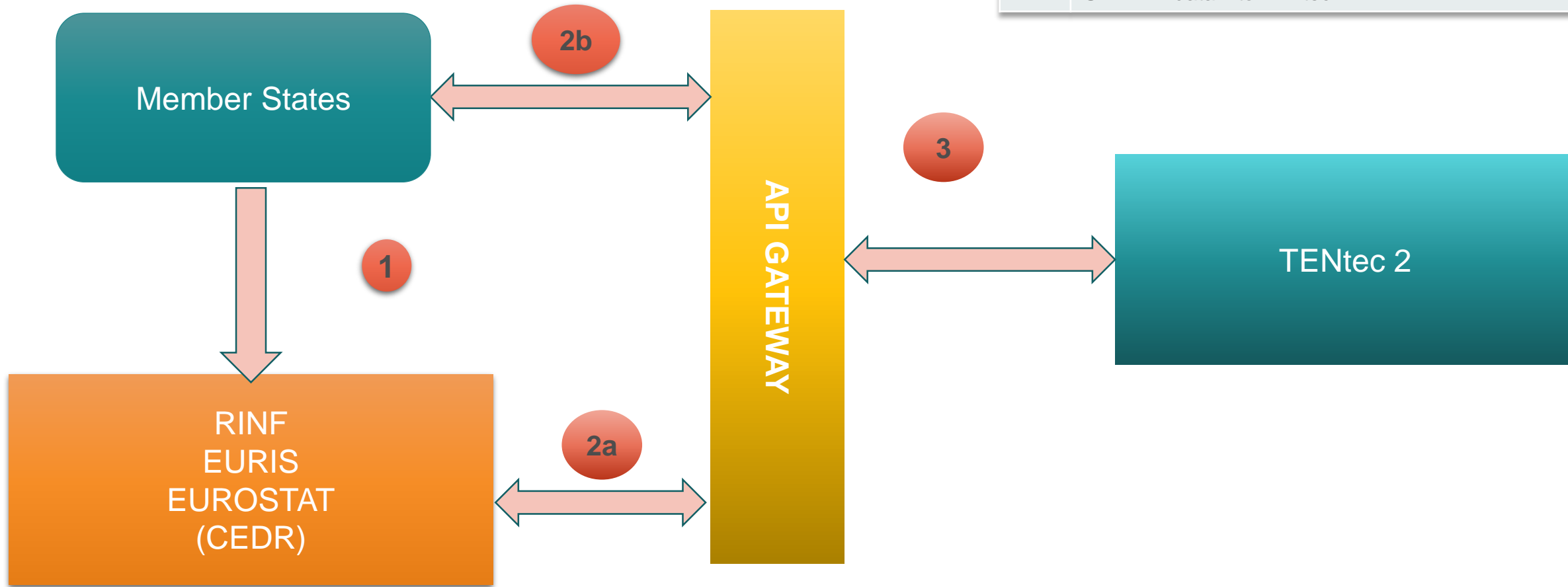
What do you get from us?

Proposed API solution and dataflow considerations

How data is transferred

Overview

Data flow example



Nr	Description
1	Basic parameters are sent to Data Source Provider
2a	TENtec gets data from Data Source Provider
2b	TENtec requests missing parameters from the Member State
3	Member State uses the Web Services solution UPDATE data into TENtec

What is the flow for exchanging data

- Member state wants to use manual updates
- Member State wants to use system to system method

What if MS already sends the relevant data to ERA/EURIS?

As depicted in 2A above, When the Member State has sent data to Data Source Provider, then TENtec will get the data from the DSP entity.

RINF:

- Tests with ERA ongoing
- If all relevant parameters are available:
 - MSs will stop sending railway data to TENtec directly (will be confirmed at later stage)

EURIS:

- Data will not be fed to TENtec before 2026

CEDR:

- Data will not be fed to TENtec (until further notice)

Pre-requisites for connection:

Manual method:
Same as in Current Method



System to system (automated)

- TEN-T sections flagged in operational transport network
- MS middleware for connecting to API gateway is required
 - The middleware/connector is build by the Member States

What if MS is not ready for AED?

- What is manual exchange of data?
 - Manual update of individual TEN-T sections via the user interface
 - Batch update of multiple TEN-T sections via manual upload of XLS and CSV files
 - Ability to correct data on the required parameters

For the Member States that are not ready for the automated exchange data, then the manual method will still be available from the new Tentec Website.



Pre-requisites for connecting to TENtec

What do we need from you

Overview

Network definition

In order to pull the correct information from any database into TENtec, directly at the source or via a **data source provider**, it requires to know which line in the national network is considered TEN-T.

Example: a rail section can have several tracks with different information, which one is the TEN-T relevant one. Based on which track do we determine if a MS is in compliance or not.

We need the assistance of the MS to "flag" TEN-T at the source.

How to do this?

- *We want to choose (maybe automatically) the highest speed when it comes to identifying the main track for TEN-T.*



Machine-to-Machine tool

What we need from you?

May 2023

Tool from Member State



Build the middleware/bridge-tool to connect to TENtec based on the Technical Specification provided



Once the middleware/bridge-tool is finished, the scenarios should be set up to respond to requests from national-data-operators.



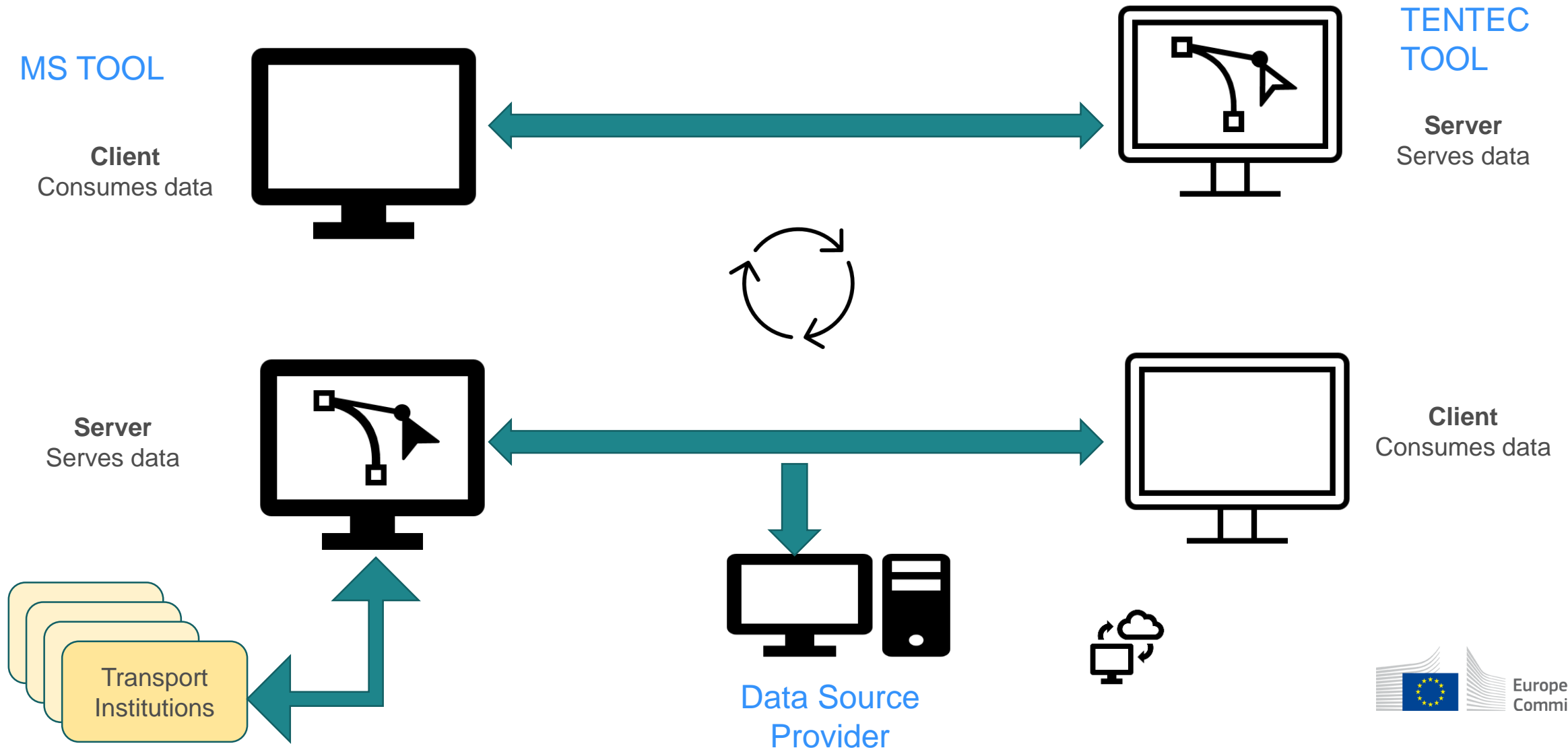
Automation of data transmission and reception is possible through the use of back-office tools that you can create. This can help streamline your operations and save time and effort.

Tool Development

Whats required?

- Create a **National tool** between national agency and the API TENtec system.
- National middleware/bridge tool helps gather data from multiple sources (national-data-operators for transport modes).
- National **middleware/bridge (tool)** is a consumer (client) and publisher (server) of transport data.
- National **middleware/bridge (tool)** ensures that notifications are correctly transmitted to national-data-operators.
 - This helps create a seamless communication process and keeps the necessary data up-to-date.
- The mid-tool should be able to communicate with the TENtec2 system, sending and receiving data, receive error details, and do updates required.
- National-data-operators should correct or update databases, and the **middleware/bridge (tool)** should be able to relay the data to TENtec.

Tool Example (Guide only)



How to get access to TENtec RESTful services

- A form will be displayed to collect the necessary information for logging in.
- A system user account will be created.
- The access is for the system and the token is secure
- Register which users have access to information and logs.
- Set up your endpoints to communicate with TENtec.
- Consult the technical standards for information on how to retrieve or update data.

What will occur?

You will be given detailed instructions on how to communicate with the server.

You will be given the TENtec endpoints.

Your system user will be able to receive responses and messages.

Web Services - Conclusions

The REST Web Services

- TENtec Web Services are currently in the process of being developed.
- The standard for creating web services called REST (Representational State Transfer) methodology is being used.
- Members and developing partners can get Access information from the TENtec technical team.
- The TENtec Technical Specifications have been published with all calls you can make.

ACTIVITIES

- Design and implementation of the RESTful service for exchange of transport infrastructure information

MILESTONES

- Defining the design the web services interface (done)
- Web Services **Gateway** and access to tests (done)
- PoC/Testing with Member States (in progress)
- Development full scale (in progress)
- Onboarding (TBD)
 - Our team will walk you through the process, one member at a time.

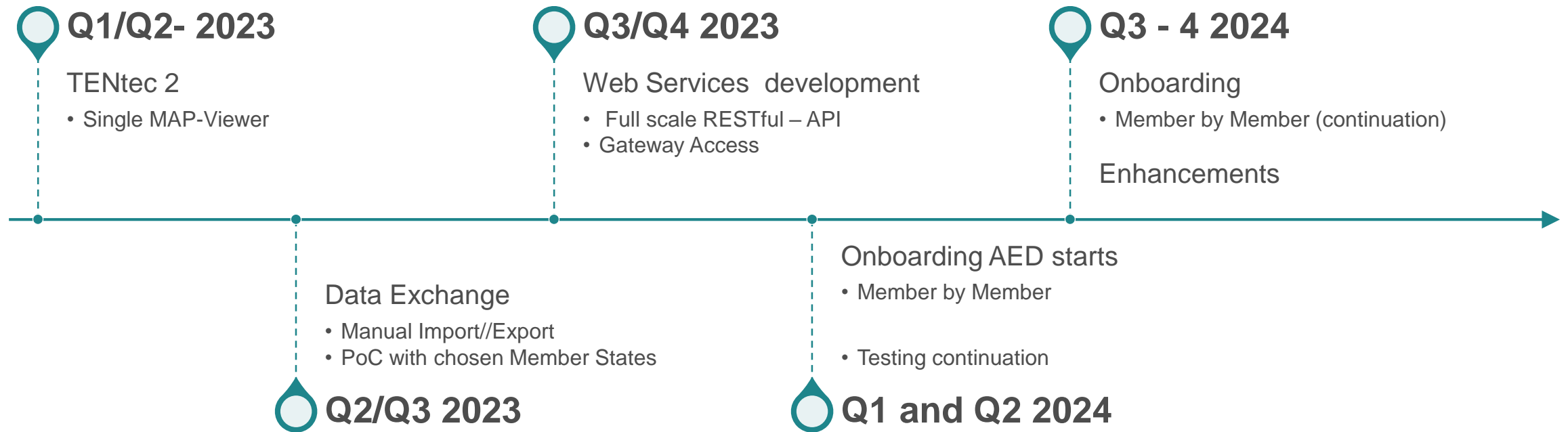


Programme plan

Programme outlook

May 2023

Programme plan



Procedure for onboarding Member States

Member States will be onboarded one-by-one starting Q1 2024

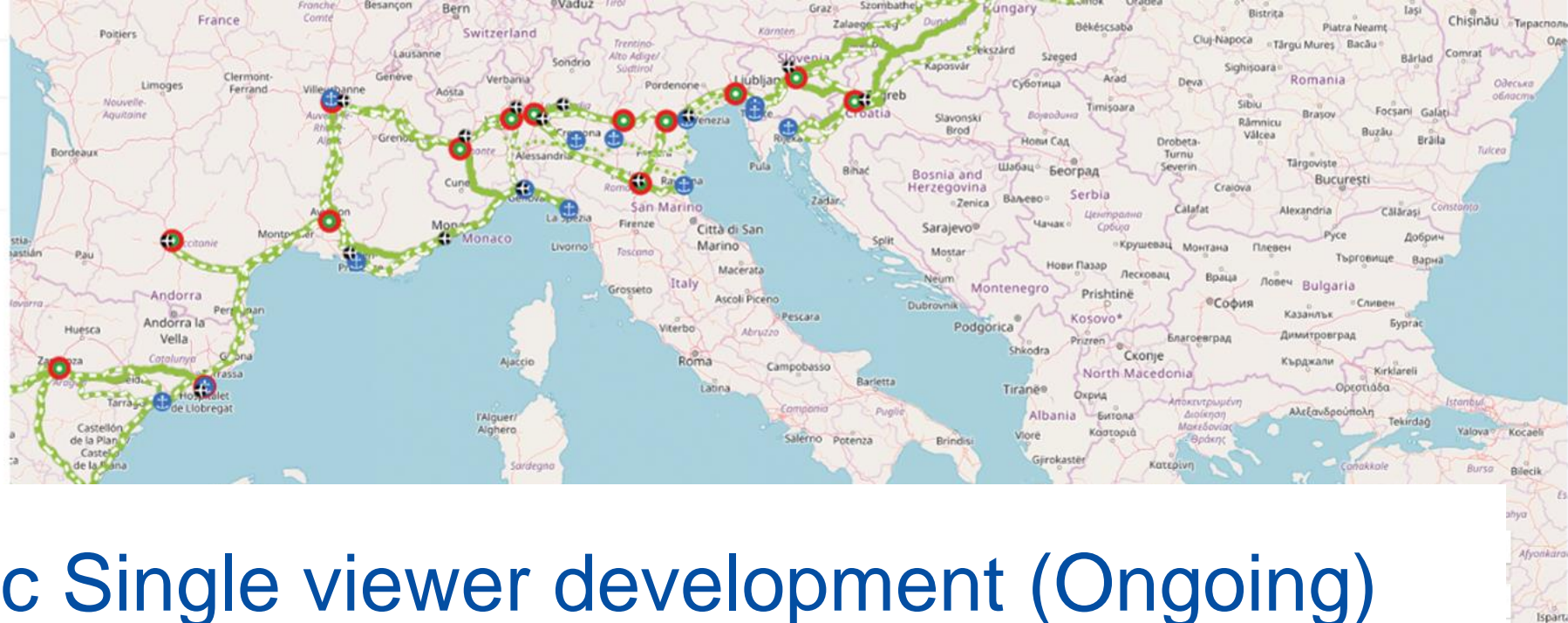
- Procedure for onboarding Member States one-by-one starting Q1 2024
 1. GIS test to match MS network with TENtec network
 2. API test to ensure connectivity between API gateway and MS middleware
 3. Obtain security key for production environment

Projects/Actions

Alternative Fuels

Linked Policy areas

TEN-T Compliance Indicators



New TENtec Single viewer development (Ongoing)

- Sign in to TENtec MAPViewer with Single-Sign-On.
- Export section data with needed parameters transportation data from the portal.
- The site can be used to update transport data for your Member State (with authorization).
- Use other tools to see gap analysis and other graphics as needed.

Planning details and next steps

- Member States are conducting tests to ensure that data is correct.
- A Proof of Concept (PoC) will be used to demonstrate Web Services to selected member states.
- To effectively link the MS, a middleware needs to be developed for the connection.
 - Our technical team is here to assist you in any way possible.
- We will begin onboarding one member at a time starting next year.
- Continuous monitoring and upgrades of online services.

Technical Specifications

Q&A

Thank you



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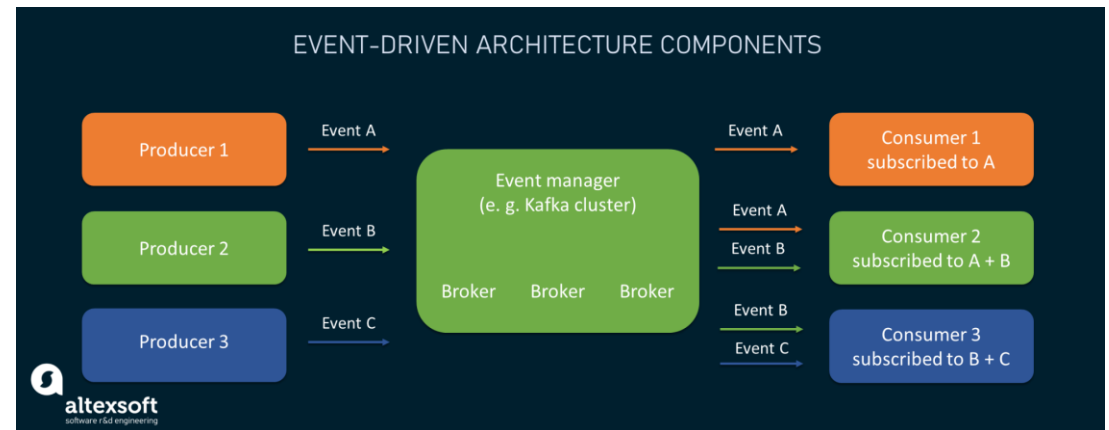
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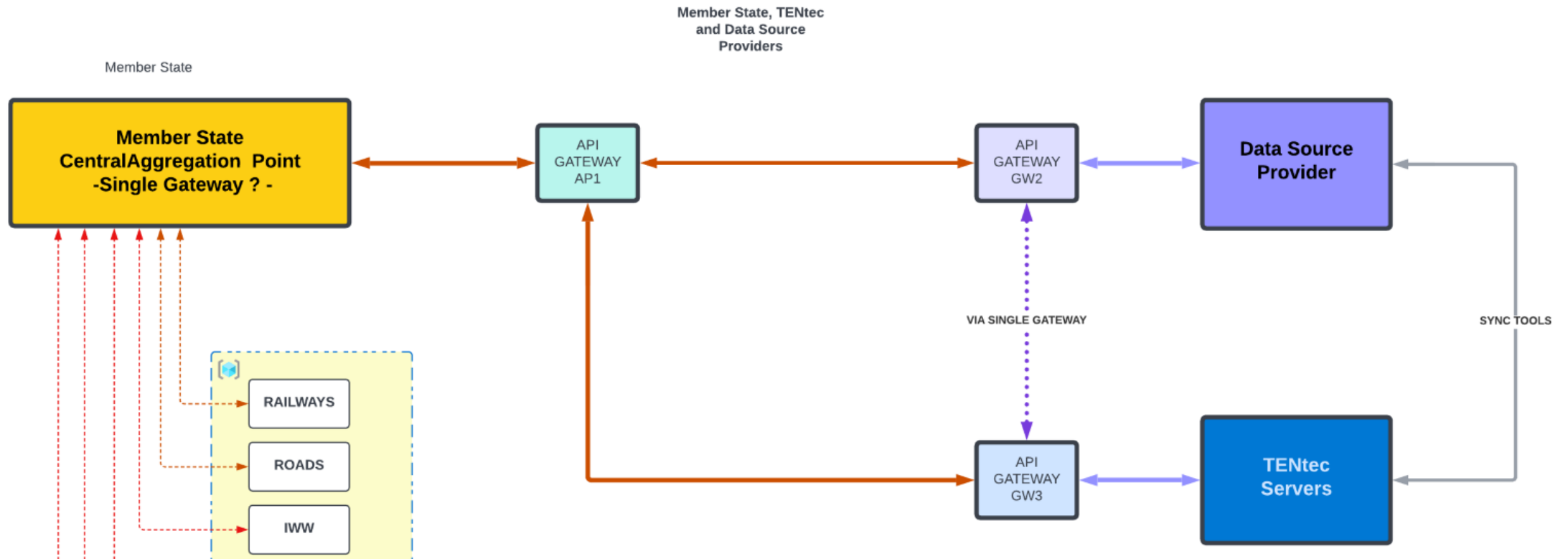
Approaches to consider: Event driven

Future aspects

- Data in the ecosystem must be correct at all times.
- When an event occurs, it is recorded in a journal.
- Make what happened public. Remember to keep track of what transpired.
- Subscribers to the publication are required.
- Send Message Notifications as needed.
- Backoffice automation is a possibility, according to reactions.
- Local and international consumers react to the incoming message.



Dataflow between Member state, TENtec and Data Source Provider (High Level) - Single Gateway



Introduction

- Current collaboration with Data Source Providers (DSP)
- Pre-requisites for connecting to TENtec
- Implementation of TENtec2 incl EC API gateway by 31 Dec 2023
- Procedure for onboarding Member States one-by-one starting Q1 2024
- Program plan – High level
- Next Steps
- New TENtec Single viewer

Which elements do we need to solve for each MS?

Parameters – do we talk about the same type of information?

Geographical – do we mean the same line / point on the map?

Transfer – do we have a device to transfer from one system to the other?