Global REN Harmonised Mapping Initiative:

User Stories [DRAFT v0.7]

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# Introduction

The Global Research and Education Network Mapping Initiative’s initial objectives are to define a schema for the homogeneous communication of network data, and to use this data in at least one reference visualisation implementation for demonstration. To ensure that the schema and reference visualisations are sufficiently complete, compatible, and convenient for all foreseen uses, we are compiling a list of features currently offered by existing map implementations, and for near-future visualisation goals.

These features are described as user stories. They are not meant to be comprehensive descriptions of the feature, nor are they prescriptive in terms of implementation. However, full general coverage of existing and planned features across visualisation implementations is desired. Not all visualisations are required (or expected) to implement all of these, but this document should represent the union of user stories for all foreseen implementations.

Once this list has been generally accepted by the community, we will derive data schema requirements from it. It is likely that the initial schema and reference visualisation(s) will satisfy a large subset of the features described herein. Extension avenues to encompass the remaining identified features will be considered.

This document is being submitted to the Global Network Architecture’s Technical Working Group for comment.

# Definitions

Map Viewer: NREN user, NREN administrator/provider, prospective or current NREN funder, member of the public.

Node: NREN connected institution, POP, or Internet Exchange; from all participating NRENs.

Link: Physical, logical, or virtual connection between two Nodes. Links may be hierarchically related; for example, one

Circuit: Low-level Link, often leased or owned infrastructure.

# User Stories

## Node Elements

### N-1: Node

As a Map Viewer, I wish to see a list of Nodes, represented graphically on a geographic map with labels.

Schema Notes: Node elements will require provisions for deduplication.

Visualisation Notes: The implementation may elect not to show labels.

### N-2:

### N-3: More Node Information

As a Map Viewer, I wish to hover over a Node and see more information about that item. I also wish to be able to click on the item for additional information in an extended pane.

Visualisation Notes: Specifics about what information to present shall be left to each visualization implementation.

### N-4: Node Type

As a Map Viewer, I wish to distinguish between classes of Nodes, or filter the list of Nodes shown to a single class. This “class” could be a type, interest, or property. For example, filter to Internet Exchanges / R&E Network Open Exchanges / eduroam. For another example, highlight research centres supporting astronomy. For another example, simply highlight all connected institutions, ignoring links.

Schema Notes: Suggest arbitrary multi-tagging ability — it covers these examples and is extensible for undefined future uses.

## Link Elements

### L-1: Links

As a Map Viewer, I wish to see the intra- and inter-NREN, inter-regional/continental links (physical or logical) on the map with labels.

Schema Notes: Link elements will require provisions for deduplication.

Visualisation Notes: The implementation may elect not to show labels.

### L-2: Link Disambiguation

As a Map Viewer, I wish to clearly see and distinguish between all of the links between the same two Nodes, when there is more than one.

Visualisation Notes: This is frequently accomplished by spreading or curving the Links to varying degrees.

Schema Notes: Disambiguation method is not intended to be specified in the schema.

### L-3: Link Ownership

As a Map Viewer, I wish to see who owns, maintains, provides, and funds each link.

Schema Notes: More than one entity may claim ownership of a Link.

### L-4: More Link Information

As a Map Viewer, I wish to hover over a Link and see more information about that item. I also wish to be able to click on the item for additional information in an extended pane.

Visualisation Notes: Specifics about what information to present shall be left to each visualization implementation.

### L-5: Link Use/Service Type

As a Map Viewer, I wish to be able to understand the use policy of a particular link (e.g. general purpose IP, LHCONE/HEP/DoE, Content Delivery Service, research only…).

**L-6: Link Consolidation**

As a Map Admin, I would like to have the ability to visualise multiple Links between two given locations as a single consolidated Link. As a Link Owner, I wish to be able to request that a given link is or is not combined into a consolidated Link visualisation. For example, identify that a Circuit travels across a particular submarine cable system. For another, consolidate two 10Gbps Circuits into a single effective 20Gbps Link, reflecting actual network configuration.

Schema Notes: Consider multi-layer hierarchy scenarios.

### L-7: Link Bandwidth

As a Map Viewer, I wish to see the nominal available bandwidth of each Link.

### L-8: Link

be able to accessrelevant metrics regarding and/or currentL,

Schema Notes: Linking to external data sources for activity metrics is the only feasible option at this time. An alternative implementation could overlay metrics on top of the map data, without any explicit linkage in the map data source, by keying on element IDs.

### L-9: Link Type

As a Map Viewer, I wish to distinguish between classes of Links, or filter to a subset of classes. This “class” could be a type, interest, or property. For example, show circuits vs. logical compound Links in different colours. For another, filter to only terrestrial links or submarine cables or satellite links, etc. For another, filter to Links owned/operated by a RAN (sub-NRE network) within my NREN.

Schema Notes: Suggest arbitrary multi-tagging ability — it covers these examples and is extensible for undefined future uses.

### L-10: Link Waypoints

As a map source data provider (usually on behalf of an NREN or RREN), I wish to be able to define a custom compound line for each link, consisting of segments between intermediate waypoints. This is to allow increased disambiguation, a geographically-accurate path for the link, or an intentionally non-geographically-accurate logical layout.

Not currently under consideration for the first editions of the schema and reference visualisations.

## Visualisation Options

### V-1: Dynamic and Zoomable

As a Map Viewer of electronic map visualisations, I wish to be able to zoom and move the focus of the display, and interact with it for clarity or additional information.

Schema Notes: Geolocation data provided must be sufficiently precise to support zooming, but sufficiently imprecise to mitigate security risks.

### V-2: NREN/Region Filter

As a Map Viewer, I wish to filter the map view to show only Nodes and links associated with a single NREN, or a single region, or a single sub-region.

Schema Notes: Suggest arbitrary multi-region tagging ability, thus supporting any definition of “region”.

### V-3: Inter-NREN Filter

As a Map Viewer, when the above NREN filter is engaged so that only a single NREN’s Nodes and links is being shown, I wish to filter the map view to show only Nodes and links that do not cross to other NRENs. Alternatively, distinguishing those types of links from intra-NREN links is acceptable.

### V-4: Infinite Scroll

As a Map Viewer, I wish to scroll indefinitely, looping around the map as required.

Visualisation Notes: This could be an east-west sliding window loop, or a pseudospherical 3D rendering.

### V-5: Default Centring

As a map visualisation administrator, I wish to configure where the map is centred by default, and also the default zoom level.

Schema Notes: Consider a field to mark the desired “centre” of each defined/referenced region.

### V-6: Logos/Branding

As an NREN administrator, I wish to be able to provide relevant branding elements, e.g. logos, for map elements.

Schema Notes: Consider embedding (SVG, base64) and/or linking to an external resource.

### V-7: Language

As a Map Viewer from participating NRENs’ countries, I wish to see the main map features in my native language. As a map source data provider, I wish to provide data in all languages served by my NREN, and also any additional languages I deem appropriate. As a map visualization administrator, I wish to request that all data be available in all languages in which I intend to publish.

### V-8: Embedding

As a service operator, I want to be able to embed map views into service visualisations and overlay with service visualisation information. This will allow network performance, network utilisation, and service quality visualisation to be shown geographically to support and complement existing tools.

Not currently under consideration for the first editions of the reference visualisations.

## Data Management

### D-1: Access

As a map source data provider, I want to have federated access to a central database where all data is consolidated/stored, enabling access for editing and map creation purposes. (This could include static printed maps in addition to dynamic electronic versions.) Also, I want to be able to define who is entitled to provide/update the data for my network.

### D-2: Version Control

As a map source data provider, I wish to be able to revert to previous versions of the data, browse changes over time, and see a timeline of changes to my data.

Not currently under consideration for the first editions of the schema.

### D-3: Element History

As a Map Viewer, I wish to see the past and future of a map element (Link or Node) or entire map. For example, when an element was brought online, or when it will be decommissioned, or when peering was installed, what element it replaces, or when it is expected to come online. For another example, the state of the network at another point in time.

Schema Notes: Some data may be inferred from the version control, if implemented, but some may be specified explicitly.

Not currently under consideration for the first editions of the schema.