

MscViewer for Nokia MSC/MSS

a modern web UI with AI-assisted analysis and automation

Railway Mobile Network: GSM-R and FRMCS

GSM-R: Global System for Mobile Communications – Railway
FRMCS: Future Railway Mobile Communication System


- Railways use dedicated mobile networks (GSM-R)
 - Public networks are not reliable enough for train operations
 - Special functions: group calls, functional addressing and location-based routing
- The mobile network is managed by the **MSC/MSS** (Mobile Switching Center/Server)
 - Connect calls between mobile users and other networks
 - Key component in GSM-R, stays in use during the migration to FRMCS
- Nokia MSC is used by many European railways

Mobile Switching Center (MSC)

- Bundle of components/modules working together, not a single monolithic tool
 - Railway-specific features in GSM-R (emergency and group calls, functional addressing, etc.) are a combination of:
 - GSM-R modules in the MSC software
 - service configuration, numbering and addressing plans
 - The command line interface is the primary way to manage configurations and plans in MSC
- ```
ZEPE:ECGI:ECI=234545,EMCC=228,EMNC=01:TYPE=BTS,NO=1000;
```
- Nokia NetAct is a GUI-based network management tool, but:
    - not specifically designed for GSM-R requirements
    - Not all functions are exposed in NetAct
    - Real-time troubleshooting needs CLI

## Problem Statement:

# Managing MSC/MSS via Command-Line Interface

- **Problem:** Complexity in managing configurations via terminal access.
  - **Challenges:**
    - Lack of overview of configurations and their relations
    - time-consuming and error-prone MSC commands
    - constant referencing of documentation
    - Missing geographical context and related information
  - **Need:** An intuitive, customizable solution for efficiently managing MSC configurations.
- 

# The Old Way

```
MAIN LEVEL COMMAND <---->
[< ZEPO:NO=1000;

LOADING PROGRAM VERSION 17.10-0

MSCi BPAE-MSS-01 2024-11-13 14:31:46

BASE TRANSCEIVER STATION DATA

BTS NAME :BTS1000 NUMBER :1000
BSC NAME :ZUBZBSC01 NUMBER :1
LA NAME :LAC3333T LAC :3333
MOBILE COUNTRY CODE(MCC)....:999
MOBILE NETWORK CODE(MNC)....:99
CELL IDENTITY(CI)....:1000
BTS ADMINISTRATIVE STATE:UNLOCKED

ROUTING ZONE(RZ)....:999
TARIFF AREA(TA)....:0
DOWNLINK DTX DISABLED BY MSC(DTX)....:OFF
CELL DEPENDENT ROUTING(CDR)....:NORMAL
CELL TEST STATE(TE)....:NORMAL CELL
LOCAL AREA DIALLING CODE(LAD)....:-
CHARGING AREA CODE(CA)....:-
SUPPLEMENTARY CHARGING AREA CODES(SCA)....:-
NO NCAS SUPPORT.....(NONCAS) :FALSE
POSITION DETERMINATION TIMER.....(POST)..:0 (x 10 msec)
ESRK USAGE.....(EU)....:NO
ESRK RANGE INDEX.....(ESRK)..:0
PARAMETER SET.....(PSET)..:-
GMLC INDEX FOR EMERGENCY SERVICES(ESGMLC) :0

LOCATION NUMBER OF CELL(CLN)...:415123331000
TYPE OF LOCATION NUMBER(TON)...:INTERNATIONAL
NUMBERING PLAN IDENTIFICATION(NPI)...:ISDN
NUMBER PRESENTATION STATUS(PRES)..:RESTRICTED
NUMBER SCREENING STATUS(SCREEN):NETWORK PROVIDED
```

# The New Way

The screenshot shows a web application interface for an MSC Viewer. The browser address bar shows 'localhost'. The page title is 'MSC Viewer'. The main content area displays 'BTS10000' with a table of parameters:

|            |                        |     |       |            |       |
|------------|------------------------|-----|-------|------------|-------|
| BTS NAME   | BTS10000               | MCC | 999   | BSC NAME   | BSC02 |
| BTS NUMBER | 10000                  | MNC | 06    | BSC NUMBER | 2     |
| LA LAC     | 00200                  | CI  | 10000 |            |       |
| LA NAME    | <a href="#">LAC200</a> |     |       |            |       |

Below the table, there are tabs for 'Map', 'Graph', 'LTE Configs', 'Cell Lists', 'GCAs', and 'Initiator in GCREFS'. The 'Graph' tab is active, showing a network diagram with nodes: 'GCA, 28000', 'GCA, 52000', 'GCREF, 280-VGCS', 'GCREF, 390-VBS', 'CELL LIST, 10000', and 'BTS, 10000'. Relationships are shown with arrows: 'GCA, 28000' uses 'CELL LIST, 10000'; 'GCA, 52000' uses 'CELL LIST, 10000'; 'GCREF, 280-VGCS' is an initiator cell for 'CELL LIST, 10000'; 'GCREF, 390-VBS' is an initiator cell for 'CELL LIST, 10000'; 'CELL LIST, 10000' contains 'BTS, 10000'; and 'BTS, 10000' belongs to 'LAC, 00200'.


On the right side, there is a command execution panel with the text: 'create gca 99888 with vbs groups 200 and 300'. Below this, it says: 'Here are the MSC commands to create GCA 99888 and add VBS groups 200 and 300 to it:' followed by the commands: 'ZHAC:GCAC=99888,GCAN=GCAN99888;;', 'ZHGC:GRID=200:GCAC=99888:STYPE=VBS::::;', and 'ZHGC:GRID=300:GCAC=99888:STYPE=VBS::::;'. An 'Execute' button is present. At the bottom of the panel is a text input field 'Type your message...' and a send button.

# MscViewer

- Provides a modern web UI to manage MSC/MSS configurations with AI-assisted analysis and automation.
- *Features:* Easy search and navigation, data and relationship visualization, access control and simplified configuration management.
- *Benefits:* Saves time, minimizes errors and provides a safe, straightforward way to access MSC/MSS data.

**Not just a fancy UI → Lower risk of misconfiguration → Better data quality →  
Reliable mobile networking → Avoid accidents**

# Feature Overview

- **Configuration visualization** — browse hierarchy, relationships, and dependency graphs.
  - **Map view** — see configurations in geographical context.
  - **External data enrichment** — integrate labels, names, and coordinates from external systems.
  - **AI agent** — query and manage configurations using natural language, including automated MSC/MSS command generation.
  - **Detail views & export** — inspect individual objects and export data to CSV/Excel.
  - **Multi-instance management** — manage multiple MSC/MSS nodes through a single interface.
  - **Customizable** — declaratively define configurations and relationships, tailored to specific requirements such as GSM-R.
- 

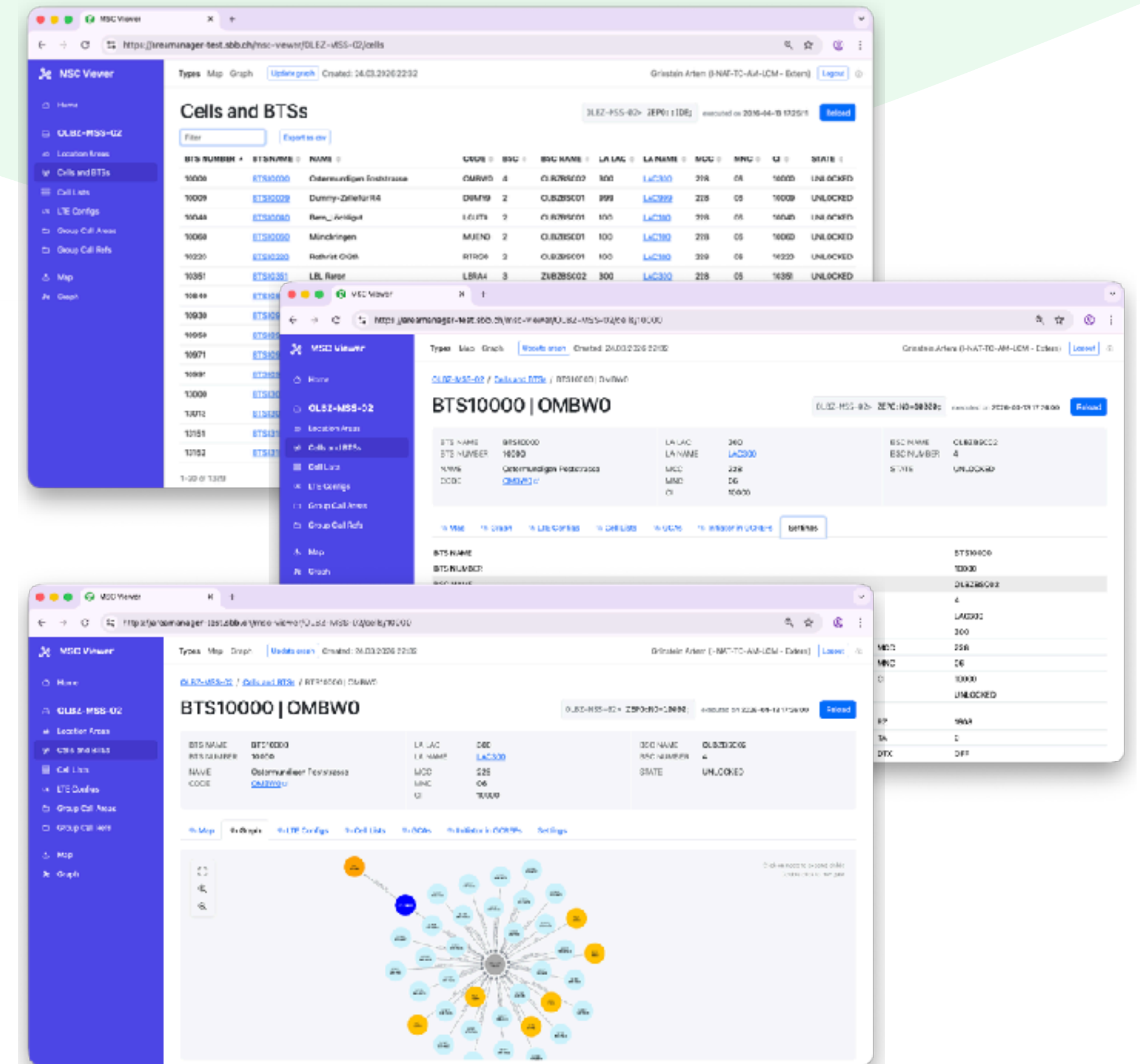
# How It Works

Declarative Configuration → Automatic UIs

```
public ConfigType cells() {

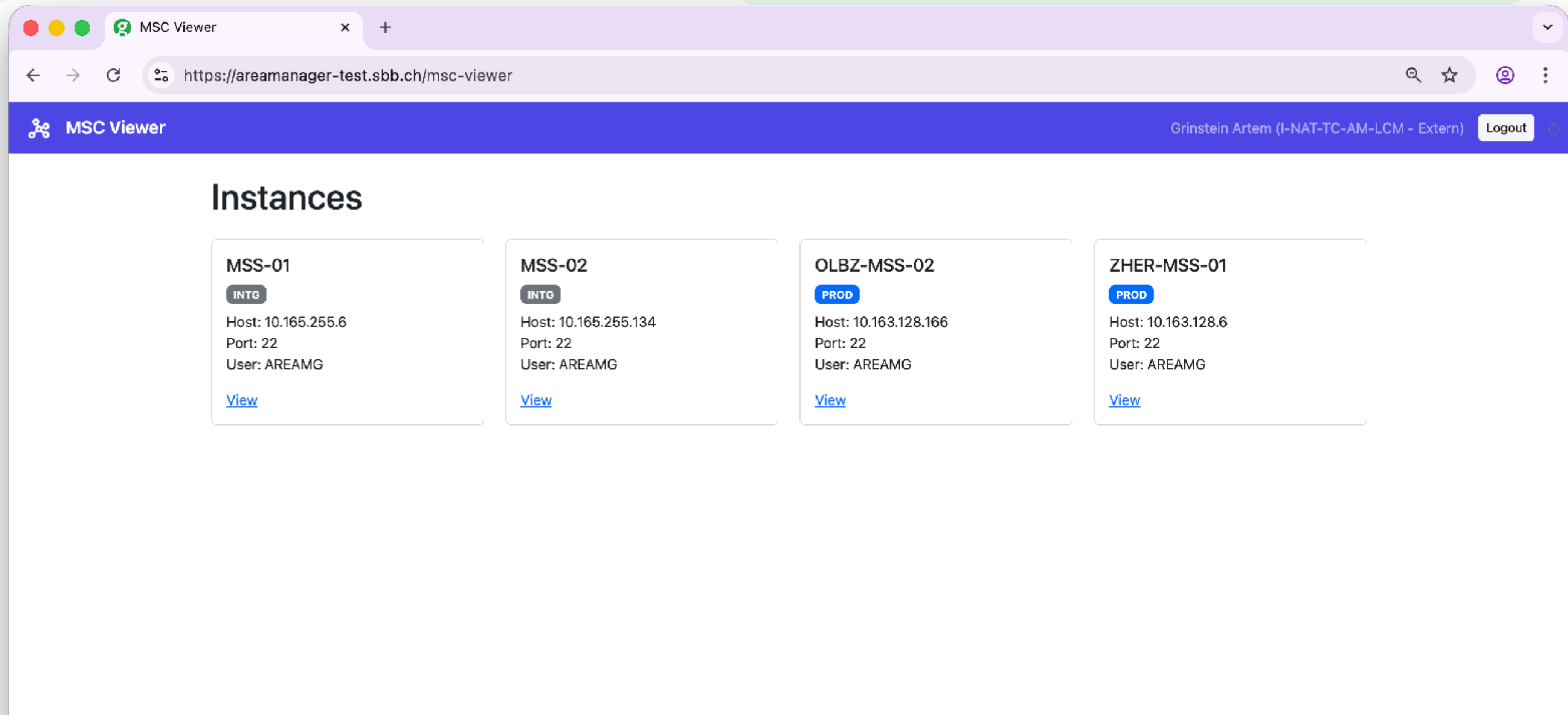
 return new ConfigTypeBuilder()
 .listCommand("ZEPO::IDE") //
 .detailCommand("ZEPO:NO=") //
 .defaultId("NO=BTS|NUMBER") //
 .node(n -> n //
 .typeLabel("BTS")
 .propMapping(
 "NAME=BTS|NAME,NUMBER=BTS|NUMBER,LAC=LA|LAC,LA_NAME=LA|NAME,BSC=BSC|NAME,CI,MCC,MNC")
 .color("blue") //
 .nameTemplate("${NUMBER}")
 .relation("lacs", "BELONGS_TO", "LAC=LA|LAC,MCC,MNC") //

 .frontend(f -> f //
 .title("Cells and BTSs") //
 .column("BTS|NUMBER") //
 .column("BTS|NAME", col -> col.linkToDetail()) //
 .column("EXTRA_NAME", col -> col.noWidth().header("NAME"))
 .column("EXTRA_CODE", col -> col.header("CODE"))
 .column("BSC|NUMBER", col -> col.header("BSC")) //
 .column("BSC|NAME") //
 .column("LA|LAC") //
 .column("LA|NAME", cl -> cl.linkTo("lacs", "LAC=LA|LAC,MCC,MNC")) //
 .columns("MCC", "MNC", "CI")
 .column("BTS ADMINISTRATIVE STATE", col -> col.header("STATE"))
 .detail(d -> d.title("${NAME} | ${EXTRA_CODE}", "NAME=BTS|NAME,EXTRA_CODE") //
 .defaultGraphQuery()
 .graphQueryWithTypes("cell-lists", "gcas")
 .graphQueryWithTypes("cell-lists", "gcrefs")
)
)
 }
}
```



# Product Tour: GSM-R Setup

## Multi-instance management

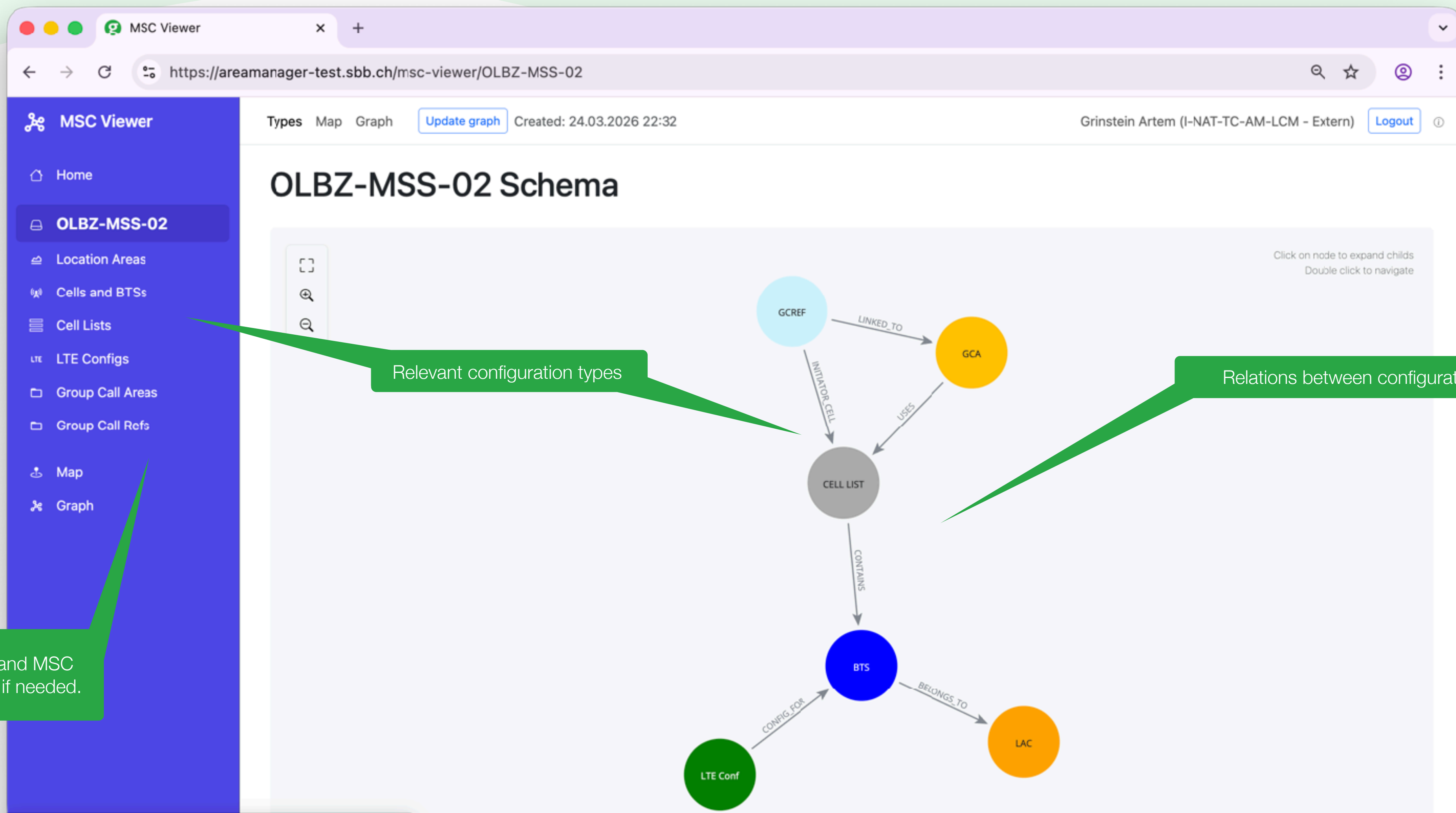


The screenshot shows a web browser window with the URL `https://areamanager-test.sbb.ch/msc-viewer`. The page title is "MSC Viewer" and the user is logged in as "Grinstein Artem (I-NAT-TC-AM-LCM - Extern)". The main content area is titled "Instances" and displays four instance cards:

| Instance Name | Status | Host           | Port | User   | Action               |
|---------------|--------|----------------|------|--------|----------------------|
| MSS-01        | INTG   | 10.165.255.6   | 22   | AREAMG | <a href="#">View</a> |
| MSS-02        | INTG   | 10.165.255.134 | 22   | AREAMG | <a href="#">View</a> |
| OLBZ-MSS-02   | PROD   | 10.163.128.166 | 22   | AREAMG | <a href="#">View</a> |
| ZHER-MSS-01   | PROD   | 10.163.128.6   | 22   | AREAMG | <a href="#">View</a> |

# Product Tour: GSM-R Setup

MscViewer is configured to visualize the GSM-R relevant configurations



# Browse Cells / BTSs

MSC Viewer

Types Map Graph [Update graph](#) Created: 24.03.2026 22:32 Grinstein Artem (I-NAT-TC-AM-LCM - Extern) [Logo](#)

OLBZ-MSS-02

Location Areas

**Cells and BTSs**

Cell Lists

LTE Configs

Group Call Areas

Group Call Refs

Map

Graph

Filter [Export as csv](#)

OLBZ-MSS-02> ZEPO::IDE; executed on 2026-04-13 17:25:11 [Reload](#)

| BTS NUMBER | BTS NAME                 | NAME                           | CODE  | BSC | BSC NAME  | LA LAC | LA NAME                | MCC | MNC | CI    | STATE    |
|------------|--------------------------|--------------------------------|-------|-----|-----------|--------|------------------------|-----|-----|-------|----------|
| 10000      | <a href="#">BTS10000</a> | Ostermundigen Poststrasse      | OMBW0 | 4   | OLBZBSC02 | 300    | <a href="#">LAC300</a> | 228 | 06  | 10000 | UNLOCKED |
| 10009      | <a href="#">BTS10009</a> | Dummy-Zelle für R4             | DUMY9 | 2   | OLBZBSC01 | 999    | <a href="#">LAC999</a> | 228 | 06  | 10009 | UNLOCKED |
| 10040      | <a href="#">BTS10040</a> | Bern_Löchligut                 | LGUT0 | 2   | OLBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 10040 | UNLOCKED |
| 10060      | <a href="#">BTS10060</a> | Münchringen                    | MUEN0 | 2   | OLBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 10060 | UNLOCKED |
| 10220      | <a href="#">BTS10220</a> | Rothrist Grüth                 | RTRG0 | 2   | OLBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 10220 | UNLOCKED |
| 10351      | <a href="#">BTS10351</a> | LBL Raron                      | LBRA4 | 3   | ZUBZBSC02 | 300    | <a href="#">LAC300</a> | 228 | 06  | 10351 | UNLOCKED |
| 10840      | <a href="#">BTS10840</a> | ABOL_Aarburg_Aarburg Längacker | ABOL0 | 2   | OLBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 10840 | UNLOCKED |
| 10930      | <a href="#">BTS10930</a> | Viège                          | VIXX0 | 3   | ZUBZBSC02 | 300    | <a href="#">LAC300</a> | 228 | 06  | 10930 | UNLOCKED |
| 10950      | <a href="#">BTS10950</a> | Gampel-Steg                    | GAXX0 | 3   | ZUBZBSC02 | 300    | <a href="#">LAC300</a> | 228 | 06  | 10950 | UNLOCKED |
| 10971      | <a href="#">BTS10971</a> | Leuk                           | LKXX1 | 4   | OLBZBSC02 | 100    | <a href="#">LAC100</a> | 228 | 06  | 10971 | UNLOCKED |
| 10991      | <a href="#">BTS10991</a> | Raspille-tunnel                | TDLR1 | 4   | OLBZBSC02 | 100    | <a href="#">LAC100</a> | 228 | 06  | 10991 | UNLOCKED |
| 13000      | <a href="#">BTS13000</a> | Oltten-Zentralstellwerk        | OLZS0 | 2   | OLBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 13000 | UNLOCKED |
| 13013      | <a href="#">BTS13013</a> | Oltten-Bahndienstgebäude       | OLBD3 | 2   | OLBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 13013 | UNLOCKED |
| 13151      | <a href="#">BTS13151</a> | ABOX_Aarburg_Aarburg           | ABOX1 | 1   | ZUBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 13151 | UNLOCKED |
| 13152      | <a href="#">BTS13152</a> | Aarburg                        | ABOX2 | 1   | ZUBZBSC01 | 100    | <a href="#">LAC100</a> | 228 | 06  | 13152 | UNLOCKED |

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« < 1 2 3 4 5 > » Size 10 20 50

Quick search

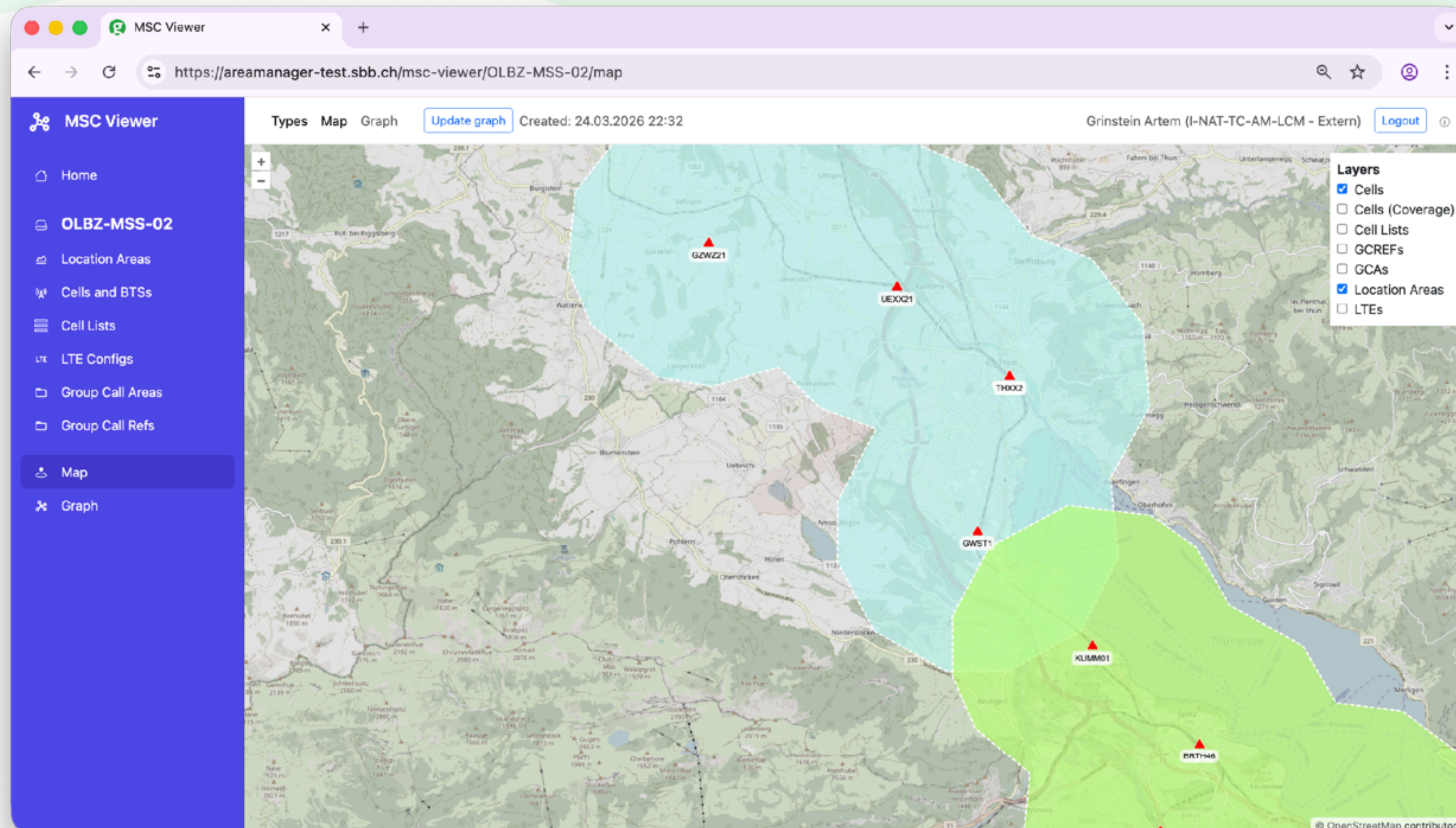
MSC command and execution timestamp

Re-run the command

External data: Name, Code

# Map View

## Configurations in geographical context



# Configuration Details

MSC Viewer

Types Map Graph | Update graph | Created: 24.03.2026 22:32 | Grinstein Artem (I-NAT-TC-AM-LCM - Extern) | Logout

OLBZ-MSS-02 / Cells and BTSs / BTS10000 | OMBW0

**BTS10000 | OMBW0** | OLBZ-MSS-02> ZEP0:NO=10000; executed on 2026-04-13 17:26:00 | Reload

|            |                           |         |        |            |           |
|------------|---------------------------|---------|--------|------------|-----------|
| BTS NAME   | BTS10000                  | LA LAC  | 300    | BSC NAME   | OLBZBSC02 |
| BTS NUMBER | 10000                     | LA NAME | LAC300 | BSC NUMBER | 4         |
| NAME       | Ostermundigen Poststrasse | MCC     | 228    | STATE      | UNLOCKED  |
| CODE       | OMBW0                     | MNC     | 06     |            |           |
|            |                           | CI      | 10000  |            |           |

Map Graph LTE Configs Cell Lists GCAs Initiator in GCREFS Settings

Configuration graph

MSC Viewer

Types Map Graph | Update graph | Created: 24.03.2026 22:32 | Grinstein Artem (I-NAT-TC-AM-LCM - Extern) | Logout

OLBZ-MSS-02 / Cells and BTSs / BTS10000 | OMBW0

**BTS10000 | OMBW0** | OLBZ-MSS-02> ZEP0:NO=10000; executed on 2026-04-13 17:26:00 | Reload

|            |                           |         |        |            |           |
|------------|---------------------------|---------|--------|------------|-----------|
| BTS NAME   | BTS10000                  | LA LAC  | 300    | BSC NAME   | OLBZBSC02 |
| BTS NUMBER | 10000                     | LA NAME | LAC300 | BSC NUMBER | 4         |
| NAME       | Ostermundigen Poststrasse | MCC     | 228    | STATE      | UNLOCKED  |
| CODE       | OMBW0                     | MNC     | 06     |            |           |
|            |                           | CI      | 10000  |            |           |

Map Graph LTE Configs Cell Lists GCAs Initiator in GCREFS Settings

|                              |           |            |       |
|------------------------------|-----------|------------|-------|
| BTS NAME                     | BTS10000  | BTS NUMBER | 10000 |
| BSC NAME                     | OLBZBSC02 | BSC NUMBER | 4     |
| LA NAME                      | LAC300    | LA LAC     | 300   |
| MOBILE COUNTRY CODE          | MCC       | 228        |       |
| MOBILE NETWORK CODE          | MNC       | 06         |       |
| CELL IDENTITY                | CI        | 10000      |       |
| BTS ADMINISTRATIVE STATE     |           | UNLOCKED   |       |
| ROUTING ZONE                 | RZ        | 1908       |       |
| TARIFF AREA                  | TA        | 0          |       |
| DOWNLINK DTX DISABLED BY MSC | DTX       | OFF        |       |

MSC output

Location Areas

Cells and BTSs

Cell Lists

LTE Configs

Group Call Areas

Group Call Refs

Map

Graph

|            |                           |         |        |            |           |
|------------|---------------------------|---------|--------|------------|-----------|
| BTS NAME   | BTS10000                  | LA LAC  | 300    | BSC NAME   | OLBZBSC02 |
| BTS NUMBER | 10000                     | LA NAME | LAC300 | BSC NUMBER | 4         |
| NAME       | Ostermundigen Poststrasse | MCC     | 228    | STATE      | UNLOCKED  |
| CODE       | OMBW0                     | MNC     | 06     |            |           |
|            |                           | CI      | 10000  |            |           |

Map Graph LTE Configs Cell Lists GCAs Initiator in GCREFS Settings

| GCAC  | NAME        | Description                    | TYPE      | GROUP CALL AREA NAME |
|-------|-------------|--------------------------------|-----------|----------------------|
| 10184 | OMBW        | Ostermundigen Poststr.6        | VGCS, VBS | GCAN10184            |
| 11758 | RME WEST    | RME WEST für VBS200 BZ Ausfall | VBS       | GCAN11758            |
| 11883 | Test TEC    | Test TEC                       | VGCS      | GCAN11883            |
| 12584 | BK OMU      | BK OMU Testlab                 | VGCS      | GCAN12584            |
| 22555 | RK OMU_LAB1 | RK OMU_LAB1                    | VGCS      | GCAN22555            |
| 22996 | RK_OMU_LAB  | Rangienotruf OMU_LAB           | VGCS      | GCAN22996            |

Related configurations

Location Areas

Cells and BTSs

Cell Lists

LTE Configs

Group Call Areas

Group Call Refs

Map

Graph

|            |                           |         |        |            |           |
|------------|---------------------------|---------|--------|------------|-----------|
| BTS NAME   | BTS10000                  | LA LAC  | 300    | BSC NAME   | OLBZBSC02 |
| BTS NUMBER | 10000                     | LA NAME | LAC300 | BSC NUMBER | 4         |
| NAME       | Ostermundigen Poststrasse | MCC     | 228    | STATE      | UNLOCKED  |
| CODE       | OMBW0                     | MNC     | 06     |            |           |
|            |                           | CI      | 10000  |            |           |

Map Graph LTE Configs Cell Lists GCAs Initiator in GCREFS Settings

Layers

- Cells
- Cells (Coverage)
- Cell Lists
- GCREFS
- GCAs
- Location Areas
- LTEs

Map View

# Create a Configuration

Structured input form

**Create LTE Configuration**

CELL / BTS  
BTS1000 / 1000 Choose...

**E-UTRAN CELL GLOBAL IDENTITY**

| ECI    | EMCC | EMNC |
|--------|------|------|
| 234545 | 228  | 01   |

**Command**  
ZEPE: ECGI: ECI=234545, EMCC=228, EMNC=01: TYPE=BTS, NO=1000;

Cancel Create / Preview

Data picker

Command preview

Form validation before submit

# AI agent

The screenshot shows a web browser window titled "MSC Viewer" with the URL "localhost:3001/msc-viewer/MSS-PROD-01/chat". The interface includes a sidebar with navigation options: Home, MSS-PROD-01, Location Areas, Cells and BTSs, Cell Lists, LTE Configs, Group Call Areas, Group Call Refs, Map, Graph, and Chat. The main content area displays a chat conversation. A user message reads: "create gca 99888 with vbs groups 200 and 300". The AI agent's response explains that no existing GCA with GCAC 99888 exists, and no existing group call refs (GIDs) 200 and 300 exist, so they can be added. It notes that the required parameter **STYPE** (must be either "VGCS" or "VBS") is needed. Since the user used "vbs groups", the agent will assign **STYPE=VBS**. It then provides the following commands:

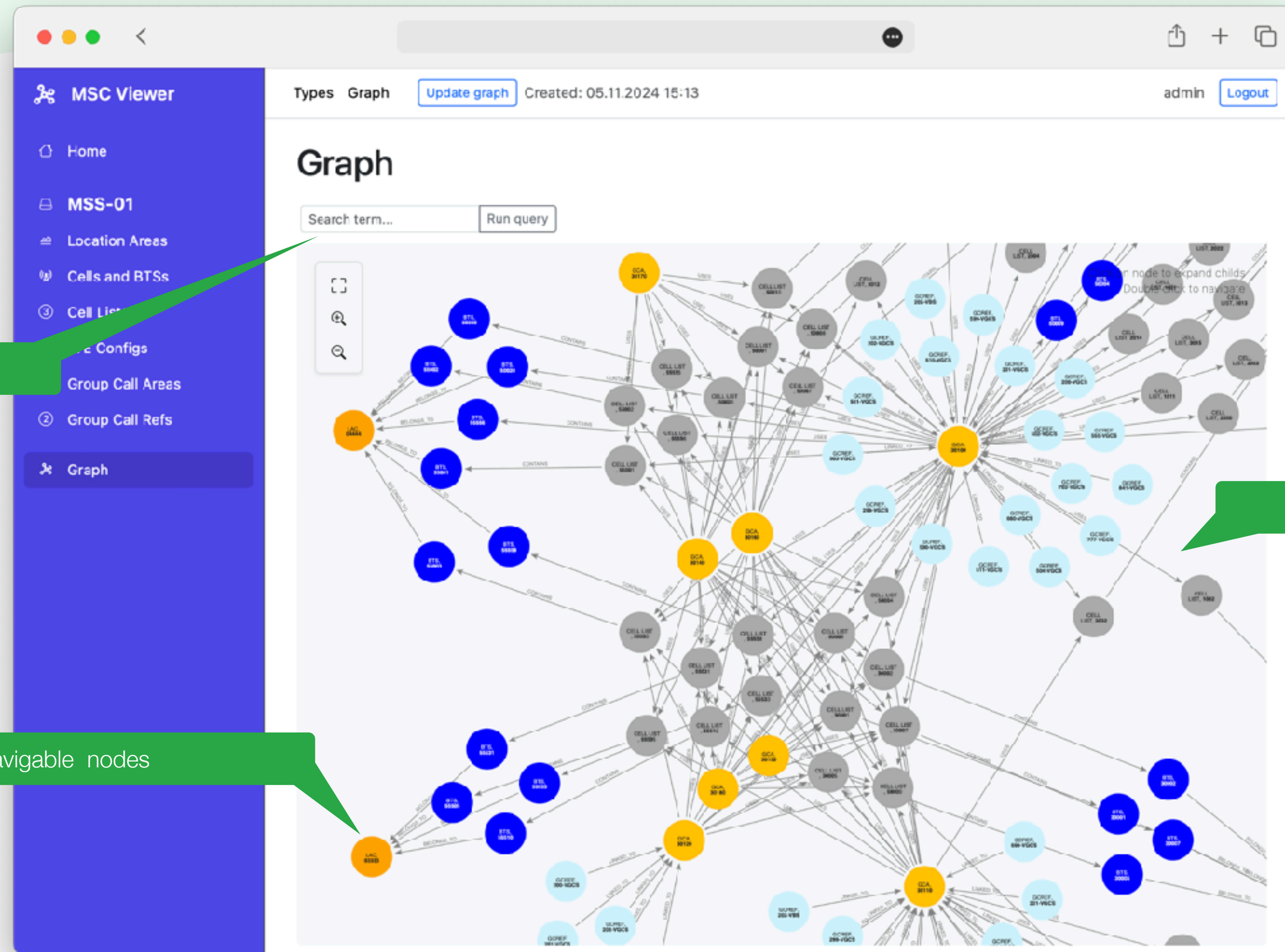
```
ZHAC:GCAC=99888,GCAN=GCAN99888;;
ZHGC:GRID=200:GCAC=99888:STYPE=VBS:::;
ZHGC:GRID=300:GCAC=99888:STYPE=VBS:::;
```

An "Execute" button is located below the commands. Below the commands, the agent states: "You can run these commands in your MSC to create the GCA and add the VBS groups." At the bottom of the chat area is a text input field with the placeholder "Type your message..." and a send button.

Manage configurations using natural language

MSC/MSS command generation and execution

# Explore Configuration Relationships



Search by attribute

Navigable nodes

Expandable configuration graph


# Steps to Launch the Solution

- Installation on-site or in an enterprise cloud environment (using Docker, Podman or similar tools)
- Configure access for MSCs, similar to access via CLI
- Define internal users or allow access through corporate Identity and Access Management (IAM)
- Configure allowed MSC commands and define relationships between them

# Our Offering: All-In-One Solution

- **Software:**
  - User-friendly, web-based tool for MSC/MSS management
  - Key features: Data visualization, configuration management and access control
- **Professional Services:**
  - Installation, customization and integration
  - Expert consulting and configuration support
- **Support:**
  - Ongoing maintenance and updates
  - Technical assistance

# Company: Greenstones GmbH

- Greenstones GmbH focuses on custom enterprise applications, with strong expertise in GSM-R, location intelligence and geocoding.
  - Our team has more than 15 years of experience in the GSM-R environment and in related systems like MSC/MSS.
  - We have extensive experience in development and support for enterprise clients, including SBB AG, Helvetia Versicherungen, Allianz SE, Pitney Bowes and Kölner Verkehrs-Betriebe.
- 

# Thank you!

**Would you like a live demo or are there any questions?**

**Contact us:**

Email: [artem.grinstein@greenstones.de](mailto:artem.grinstein@greenstones.de)

Website: [www.greenstones.de](http://www.greenstones.de)