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“Minimum geodata model” documentation

Registry of public network mobile telephony antennas



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1 Situation

Geoinformation Act, Geoinformation Ordinance

The Geoinformation Act (GeoIA, CC 510.62) has the aim of ensuring that geodata relating to the territory of the Swiss Confederation is made available for general use to the authorities of the Confederation, the cantons and communes, the private sector, the public and to academic and scientific institutions in a sustainable, up-to-date, rapid and easy manner, in the required quality and at a reasonable cost with a view to widespread use (Art. 1). It is desirable that everyone should have the data available in an easily accessible form. For this purpose, the Federal Council is enumerating in a catalogue the basic geodata under federal law and enacting provisions on the requirements applicable to this geodata (Art. 5).

For its part, the Ordinance on Geoinformation (OGeo, CC 510.620) specifies the conditions for implementation of the Act. In its Annex 1, it includes a catalogue of basic geodata under federal law, indicating, under each heading, a competent federal office. The latter is obliged to define minimum models for the geodata falling within its area of competence (Art. 9 para. 1). Within the limits of the law, these models are determined by the technical requirements and the state of the art (Art. 9 para. 2).

Method for defining the minimum geodata models

The geoinformation coordination agency at federal level (GCG) recommends the adoption of an approach based on a model to define the minimum geodata models. It is a matter of describing, structuring and abstracting objects of interest from the real world in a specific technical context. The operation is carried out in two stages. First of all, the extract from the real world is described in everyday language (semantic description). In the subsequent formalisation, the description is transposed into formal language, both graphic (UML) and textual (INTERLIS). A project team consisting of experts responsible for capturing, conserving, updating and using the geodata draws up the semantic description of the content.

This procedure is reflected in this document. The extract from the real world is defined in the chapter entitled "Introduction". The chapter entitled "Description of the model" presents in everyday language the technical context which is used as a basis for the conceptual data model (chapter: "Structure of the model: conceptual data model").

2 Introduction

2.1 Thematic introduction to the datasets

On its territory Switzerland has a large number of antennas for mobile telephony. These antennas belong to the mobile network access providers and provide almost 100% coverage of the territory.

These antennas are currently equipped with four types of technology:

- GSM 2G (Global System for Mobile Communications)
- UMTS 3G (Universal Mobile Telecommunications System)
- LTE 4G (Long Term Evolution)
- NR 5G (New Radio)

Each antenna emits in a direction which is close to it (omnidirectional or directional) and has a power which is adapted to its context. Several antennas may be located on the same site (mast).

Genesis, data management

Regularly, approximately every two weeks, the mobile telephony operators send their data to OFCOM. These data are then aggregated and classified according to their emitting power. This means, for example, that for a building which has two masts on its roof each with three antennas, aggregation will give a mast/antenna with an emitted power classified according to the table in section 5.1.1. Then, every day, this data is published on OFCOM's WebGIS site www.funksender.ch.

This data is generated and published for the purpose of informing the population. Discrepancies with the reality on the ground cannot be excluded.

Links

Metadata: [GSM](#), [UMTS](#), [LTE](#), [NR](#)

Data model: <http://models.geo.admin.ch/BAKOM>

3 Basis for modelling

3.1 Existing information

The Telecommunications Act

The TCA of 30 April 1997 is the specific legal basis for this minimum geodata model (CC 784.10 Art. 13, 24 s.).

4 Description of the model

For each service (GSM, UMTS, LTE and NR), the object is modelled by its geographical position on the ground (www.funksender.ch > TO OVERVIEW MAP > Position of the 5G (NR) antennas, Position of the 4G (LTE) antennas, Position of the 3G (UMTS) antennas or Position of the GSM antennas. Each object also includes a unique identifier (ID), the geographical coordinates of the antenna (LV95) and the power class of the antenna (Powercode: 4 classes (P1-P4, see section 5.1.1 below).

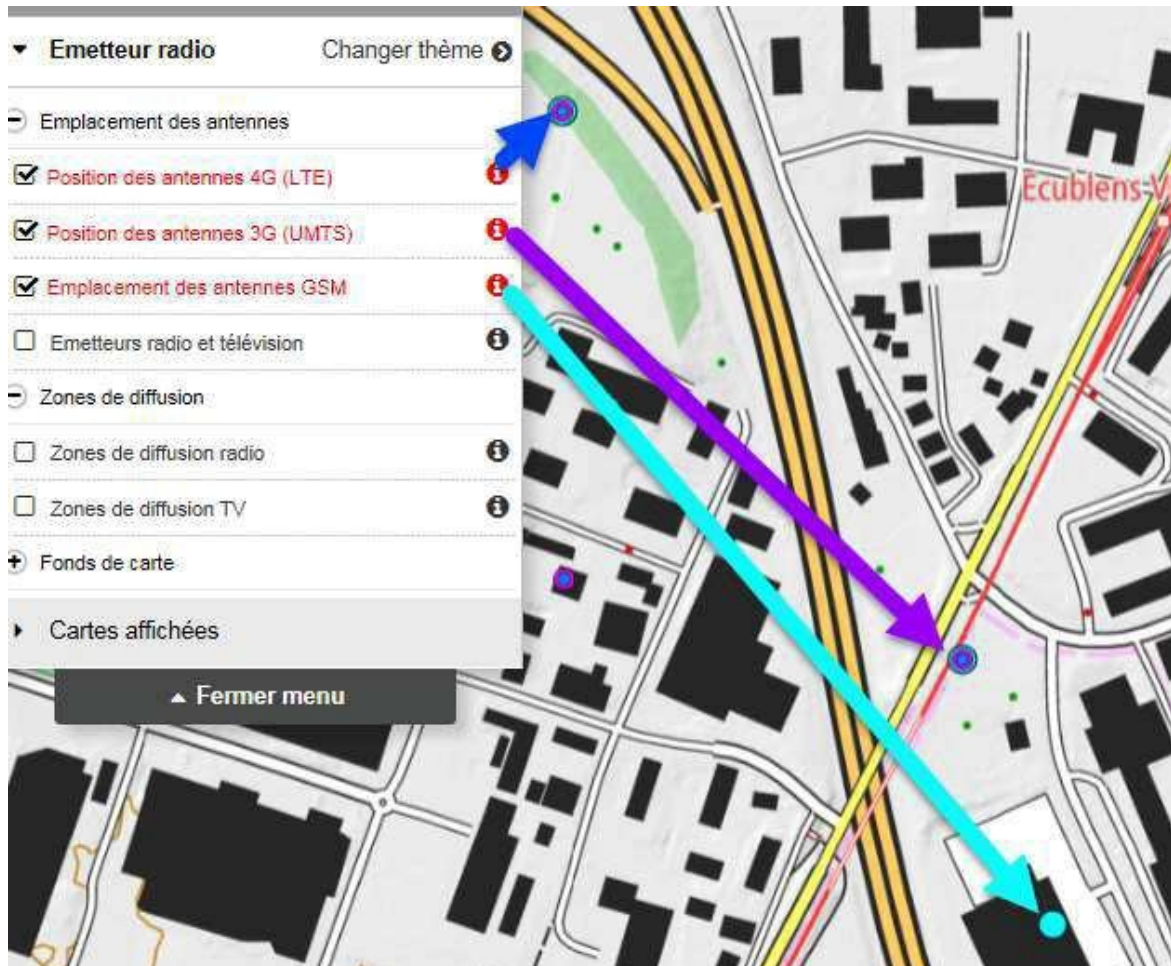


Illustration 1: Example of an antenna position

5 Structure of the model: conceptual datamodel

5.1 Diagrams of UML classes and object catalogue

GSM_UMTS_LTE_NR
Identification : Zeichenkette
Geometry : Coord2
PowerCode : PowerCode
Des_PowerCode : MultilingualText
MobileType : Type
PubDate : XMLDate

Illustration 2: Diagram of UML classes

Name	Cardinality	Type	Description
Identification	1	Numeric	Number of max 5 positions. Is also the primary key. Example 111
Geometry	1	Coord2	Geographical co-ordinates (point) in LV95
PowerCode	1	PowerCode	List of values (P1-P4) Example P3
Def_PowerCode	1..n		Sendeleistung (ERP) Puissance rayonnée (ERP) Potenza irradiata (ERP) Effective Radiated power (ERP) Example: Medium
MobileType	1	Type	GSM, UMTS, LTE or NR
PubDate	0..1	XMLDate	Publication date Date: YYYY-MM-DD Example: 2016-03-10

Table 1: GSM_UMTS_LTE_NR class attributes

5.1.1 Power code description (Attribute PowerCode and Def_PowerCode)

POWERCODE (Power class)	FRE	GER	ITA	ENG	RUM
P1	Très faible	Sehr klein	Molto debole	Very weak	Sehr klein
P2	Faible	Klein	Debole	Weak	Klein
P3	Moyenne	Mittel	Media	Medium	Mittel
P4	Forte	Gross	Forte	Strong	Gross

Table 2: “Powercode” multilingual enumeration

5.1.2 MobilType enumeration

Name	Description
GSM	Global System for Mobile Communications
UMTS	Universal Mobile Telecommunications System
LTE	Long Term Evolution
NR	New Radio

Table 3: “Type” enumeration

6 Annex A Glossary

Geodata	Geospatial data that is related in time to the dimensions and characteristics of certain spaces and objects and in particular their position, nature, use and legal relationships.
<i>Official geodata</i>	Geodata that is based on a legislative enactment of the Confederation, a canton or a commune.
INTERLIS	Data description language and geodata transfer format of transfer independent of a platform. INTERLIS enables precision modelling of data models.
GSM	Global System for Mobile Communications
UMTS	Universal Mobile Telecommunications System
LTE	Long Term Evolution
NR	New Radio
UML	Unified Modelling Language. Graphic modelling language used to define object-oriented data models.

7 Annex B – Complementary documents

Cover photo: Unknown

8 Annex C – INTERLIS model file

```
INTERLIS 2.3;

/**
 * # DE: Minimales Geodatenmodell "Antennenkataster der Anlagen der öffentlichen Mobilfunknetze"#
 * # FR: Modèle de géodonnées minimal " Cadastre des antennes des réseaux publics de téléphonie
mobile"#
 * # IT: Modello di geodati minimo "Catasto delle antenne degli impianti delle reti pubbliche di telefonia
mobile"#
 * # EN: Registry of public network mobile telephony antennas"#
 */

/**Modell im Bezugsrahmen LV95**/

!!@ IDGeoV="111.1,111.2,111.3"
!!@ technicalContact=mailto:gis@bakom.admin.ch
!!@ furtherInformation=http://www.funksender.ch
MODEL AntennaLocation_LV95_V1 (en)
  AT "http://www.models.geo.admin.ch/BAKOM/"
  VERSION "2016-03-15" =
  IMPORTS GeometryCHLV95_V1, LocalisationCH_V1;

  TOPIC Location_Antenna =
  DOMAIN
    PowerCode = (P1, P2, P3, P4);
    Type= (GSM, UMTS, LTE, NR);

  CLASS GSM_UMTS_LTE_NR =
  Identification: MANDATORY TEXT*5;
  Geometry: MANDATORY GeometryCHLV95_V1.Coord2;
  PowerCode: MANDATORY PowerCode;
  Def_PowerCode: BAG{1..*} OF LocalisationCH_V1.MultilingualText;
  MobileType: MANDATORY Type;
  PubDate:INTERLIS.XMLDate; /** Datumseingabe: "Year-Month-Day" **/
  UNIQUE Identification;
  END GSM_UMTS_LTE_NR;
  END Location_Antenna;
END AntennaLocation_LV95_V1.
```