Navigation Shape format description v1.2

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AND Automotive Navigation Data

AND Automotive Navigation Data is leading provider of digital mapping data used for location-based services around the world. AND Automotive Navigation Data focuses on the development of digital maps in Central and Eastern Europe, North-Africa, Central and South America and Australia. The digital maps are used in personal and ‘in-car’ navigation, Internet-based mapping, fleet management and more. The company employs approximately 250 employees. The company was founded in 1984, is headquartered in Rotterdam, the Netherlands and is listed on Euronext Amsterdam (AND).

AND is found on the internet via www.and.com.

Revision history

Date	Version	Remarks
23-Dec-05	v1.0	
	•	**Added functional road class** Fc# in RD_OTHER field in Roads file
	•	**Added long haul** Lh# in RD_OTHER field in Roads file
	•	**Added stub Links** Stub# in RD_OTHER field in Roads file
	•	**Added house number ranges** Hn# in RD_OTHER field in Roads file
	•	**Code page support** Per country, a code page in Navigation Shape *.dbf files
	•	**Added synonyms – exonyms** Creation of Alias table
	•	**Added administrative boundaries** Per country administrative boundaries are delivered
	•	**Added signpost information** Creation of Signpost table
	•	**Added land use polygons** Following land use polygons are added: - Beach, dune and plain sand - Built-up area - Cemetery - Forest, Woodland - Golf course - Industrial area - Moors and heath land - Park, garden
17-Jan-06	v1.1	**Added types of boundary files** Updating of field ND_TYPE (boundary files)
23-Feb-06	v1.2	**Updated roads file** Updating of field RD_FLOOR Updating of field RD_LEVEL

Table of contents

1. Locations file

Field	AND descriptive name	Format	ID	Description
ND_1	ND_ID	N8		Internal AND-ID
ND_2		N2	0	Used for compatibility with AND format, always '0'
ND_3		N2	0	Used for compatibility with AND format, always '0'
ND_4	ND_TYPE	N3		Node type
			0	Standard node
			1	Junction (exit)
			2	Intersection
			3	Border node
			4	Directional information
			5	Toll Booth Info
			9	Level dead end, location other than a type 3 or 10-27 where a level may terminate
			10	Capital City
			11	Large city > 500,000
			12	Medium city > 100,000
			13	Small city > 50,000
			14	Town > 20,000
			15	Village > 5,000
			16	Small village > 1,000
			17	Tiny village < 1,000
			19	Postal code point
			20	Postal code area
			21	Numbered town district (e.g. Dublin 4)
			22	Town district > 100,000
			23	Town district > 50,000
			24	Town district > 20,000
			25	Town district > 5,000
			26	Town district > 1,000
			27	Town district < 1,000
				A town or village is upgraded (one or two types) if it is a national or regional centre.
				A village of type 17 is upgraded to type 16 if it has an own postal code.
				A village (type 16 or 17) is upgraded (one type) if it is important from a tourist point of view.
			30	Railway station
			36	Car/train terminal
			40	Airport; no information available
			41	Big international airport (>10,000 flights per year)
			42	Medium international airport (400-10,000 flights per year)
			43	Small international airport (<400 flights per year)
			44	Heliport
			45	Seaplane Base
			46	Big national airport (>10,000 flights per year)
			47	Medium national airport (400 - 10,000 flights per year)
			48	Small national airport (<400 flights per year)
			80	Rest area with at least parking and petrol station.
			81	Rest area with parking only
			82	Rest area with only parking and petrol station

Field	AND descriptive name	Format	ID	Description
			83	Rest area with parking, petrol station and restaurant
			84	Rest area with parking, petrol station, restaurant and hotel
			85	Rest area with parking, restaurant and hotel
ND_5	ND_NATION	N3		Nation code (table is available _c.lst file)
ND_6	ND_LEVEL	N2		Connection level. The connection level of a node equals the level of the road on which it is situated (see Roads file)
ND_7	ND_DELETED	L		For backward compatibility (0)
ND_8	ND_ZIP	C10		Postal code
ND_9	ND_NAME	C60		Name
ND_10	ND_NAME_PREFIX	C10		Name prefix, e.g. “la”
ND_11	ND_NAME_SUFFIX	C20		Name suffix, e.g. “bei Wien” or “plage”
ND_12	ND_NAME_COMP	C2		Compass direction (N, S, E, W, NE etc.) of ND_NAME
ND_13	ND_CODE	C10		Official code belonging to ND_NAME. Exit number Community code IATA airport code Etc.
ND_14	ND_PROV	N3		Province code (table is available _p.lst file)
ND_15	ND_UN_PROV	L		Flag if province code is needed for unique making of ND_NAME
ND_16	ND_UN_CITY	C60		City name for unique making of ND_NAME
ND_17	ND_UN_CITY_PREFIX	C10		Prefix for ND_UN_CITY
ND_18	ND_UN_CITY_SUFFIX	C20		Suffix for ND_UN_CITY
ND_19	ND_UN_CITY_PROV	N3		Province code for unique making of ND_UN_CITY
ND_20	ND_UN_CITY_COMP	C2		Compass direction relative to ND_UN_CITY for unique making of ND_NAME
ND_21	ND_CONURB	C60		Name of conurbation to which suburb or town district belongs
ND_22	ND_CONURB_PREFIX	C10		Prefix for ND_CONURB
ND_23	ND_CONURB_SUFFIX	C20		Suffix for ND_CONURB
ND_24	ND_CONURB_UN_PROV	N3		Province code for unique making of ND_CONURB
ND_25	ND_ID_PERMANENT	N10		Permanent node ID, internal AND
ND_26	ND_DBLINK	C60		Field for client specific ID or ID’s, e.g. ESRI = 123456
ND_27	ND_KM	C30		Kilometres / Mileage
ND_28	ND_TMC	C60		TMC-code
ND_29	ND_OTHER	C60		For internal use

2. Roads file

Field	AND descriptive name	Format	ID	Description
RD_1	RD_ID	N8		ID of roads
RD_2		N2	0	Used for compatibility with AND format, always '0'
RD_3	RD_LENGTH	N5		Road length in hectometers
RD_4	RD_DIRECTION	N1		Permitted Traffic Flow
			0	Traffic allowed in both directions
			1	Traffic allowed from RD_ID_FROM to RD_ID_TO
			2	Traffic allowed from RD_ID_TO to RD_ID_FROM
RD_5	RD_TYPE	N2		Road classification
			1	Motor way
			2	Federal highway dual carriage way (motor way characteristics)
			3	Federal highway
			4	Regional road
			5	Local road
			6	Other road
			7	Ferry (cars and cargo)
			9	Train ferry (passenger and/or cargo)
			30	Railway, passenger and/or freight transport
			50	Link to airports, railway stations
			58	Walking connection between Railway stations
			59	Virtual connection. Used to connect features in the data that are not linked by any other defined features in the database
RD_6	RD_NATION	N3		Nation code (table is available _c.lst file)
RD_7	RD_LEVEL	N2		Connection level. The connection level of a road expresses the importance of that road. The general classification is as follows:
			0	E-roads in Europe
			1	Important national roads in such a way that all type 10 to 13 locations are connected. Scale ≈ 1 : 4,000,000
			2	Secondary roads in such a way that all type 10 to 14 locations are connected. Scale ≈ 1 : 2,000,000
			3	Through roads in such a way that all type 10 to 15 locations are connected. Scale ≈ 1 : 1,000,000
			4	Local connector roads in such a way that all type 10 to 16 and 20 to 26 locations are connected. Scale ≈ 1 : 500,000
			5	Other roads Scale ≈ 1 : 250,000
			6	All other roads (streets)
			10	All railways
RD_8	RD_DELETED	L		AND Internal Code
RD_9	RD_SLOW	C1	C	Slow road type (road within city limits)

RD_10	RD_NAME	C60		Road (street) name
RD_11	RD_CODE_NAT1	C12		National road number
RD_12	RD_CODE_NAT2	C12		National road number
RD_13	RD_CODE_NAT3	C12		National road number
RD_14	RD_CODE_INT1	C12		International road number
RD_15	RD_CODE_INT2	C12		International road number
RD_16	RD_CODE_INT3	C12		International road number
RD_17	RD_TUNNEL	L		Tunnel flag
RD_18	RD_TOLL	L		Toll flag
RD_19	RD_TIME	N5		Ferry journey time in minutes
RD_20	RD_FLOOR	N1		Relative height to a crossing feature 1 is below 2 is below 3 etc. 9 if relative height is unknown.
RD_21	RD_TONNAGE	N3		Tonnage admitted on ferry
			-1	Only passengers (ferries) – Also used for pedestrian streets/ virtual connections
			3	max. 3.5 metric tons
			28	max. 28 metric tons
			40	max. 40 metric tons
			99	> 100 tons
RD_22	RD_TOLL_CARGO	L		Toll (for trucks only) flag
RD_23	RD_OTHER	C60		Other Attributes:
			Sr#1	Slip road segment
			Rb#1	Roundabout segment
			Lb#1	Lay-by segment
			4wd#1	Four wheel drive road segment
			Unsealed#1	Unsealed road segments
			Fc#[0-4]	Functional road class 0 to 4
			Lh#1	Long haul
			Stub#1	Stub link
			hn#	Housenumber range L : left, direction from FNODE_ to TNODE_ R: right, direction from FNODE_ to TNODE_ E: even O: odd M: mixed e.g. hn#LE2-12#RO1-11
RD_24	RD_PROV	N3		Province code (table is available _p.lst file)
RD_25	RD_CITY_ID	N11		City code of link (link to ND_ID)
RD_26	RD_MUN_ID	N11		Municipality code of link (table is available _m.dbf file)
FNODE_	FNODE_	N12		From node ID of link
TNODE_	TNODE_	N12		To node ID of link

3. Maneuvers and Path index file (TUR, PTH)

3.1 Maneuvers file *.TUR

No	Field	Format	Values	Description
1	ID	N8		Maneuver ID
2	TYPE	C60	Prohibited maneuver Priority maneuver Bifurcation	Prohibited maneuver only.
3	BIFTYPE	C60	Undefined Multi lane fork Simple fork Exit bifurcation	Classification of the bifurcation type maneuver.

3.2 Path index file *.PTH

No	Field	Format	Values	Description
1	ID	N8		Maneuver ID
2	SEQNR	N1		Sequence number
3	TRPELID	N8		Road element ID / Node ID, derived from Fnode_ or Tnode_ (refers to roads file : AND_ID of link).

4. Signpost index table and signpost file (SIT, SIP)

4.1 Signpost Index Table file *.SIT

No	Field	Format	Values	Description
1	ID	N8		Signpost ID
2	SEQNR	N1		Sequence Number
3	TREL ID	N8		Roads ID (refers to Roads file: RD_ID)
4	TREL TYPE	C60	Road	Type (Road)

4.2 Signpost Table file *.SIP

No	Field	Format	Values	Description
1	ID	N8		Signpost ID
2	JUNCTION ID	N8		Road Node ID (derived from Fnode_ or Tnode_)
3	SEQNR1	N1		Sequence Number
4	SEQNR2	N1		Sequence Number
5	INFO TYPE	C60		Information type
6	TEXT	C60		Place name/Exit name
7	TEXT LANG	C3		MARC Language code
8	CON TYPE	N1	0	Undefined
			1	Branch
			2	Towards
			3	Exit

5. Boundary files

Field	AND descriptive name	Format	ID	Description
ND_1	ND_ID	N8		Internal AND Link ID
ND_4	ND_TYPE	N3		Region type
			90	Land
			91	Inner seas and huge lakes with major geographical referential impact
			92	Very big river/lake and/or country separating river/lake
			94	Province/department separating river/lake
			95	Capital or Metropolis
			96	Forest, Woodland
			97	Other river/lake
			98	Other city cities having population more than 5000
			99	Airports (National and International)
			100	Ocean, sea
			101	City park, garden
			102	Regional, national park
			103	Small cities having population less than 5000
			104	Cemeteries
			105	Golf course
			106	Beach, dune
			107	Plain sand
			108	Moors, heath land
			109	Industrial area
ND_5	ND_NATION	N3		Nation code (table is available)
ND_9	ND_NAME	C60		Name
ND_14	ND_PROVINCE	N3		Province code (table is available)

Following administrative boundaries are delivered:

<file name>_admin0.* Highest delivered administrative division. Equal to order 0 in GDF3.0 specification (country).
<file name>_admin8.* Lowest delivered administrative division. Equal to order 8 in GDF3.0 specification.
<file name>_admin[1..7].* Intermediate administrative division.

Landuse boundaries:

<file name>_a.* Airports (National and International)
<file name>_b.* Beach, dune and plain sand
<file name>_c.* City, built-up area
<file name>_ce.* Cemetery
<file name>_f.* Forest, woodland
<file name>_gf.* Golf course
<file name>_h.* Moors and heath land
<file name>_i.* Island
<file name>_in.* Industrial area
<file name>_o.* Ocean/sea
<file name>_pk.* Park, garden
<file name>_w.* Water boundaries or
<file name>_w_maj.* Major water boundaries
<file name>_w_min.* Minor water boundaries

6. Administrative division files

The level of the administrative division can vary from country to country but it is referred to as the province boundary layer in all cases, and is the most detailed level of administrative division supplied for each country.

6.1 Administrative divisions format

Associated with the province boundary layer, there are 4 comma-separated '*.lst' files:

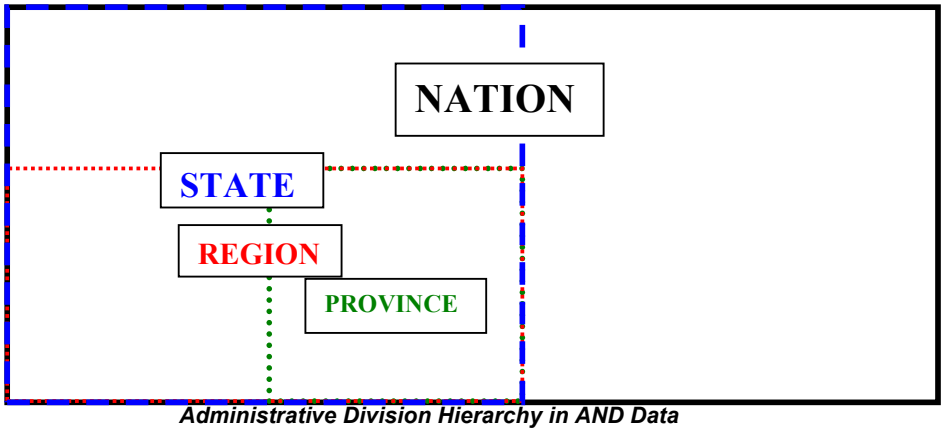
- *_p.lst (Province)
- *_r.lst (Region)
- *_s.lst (State)
- *_c.lst (Country)

6.2 Administrative divisions in the data

The number of hierarchical divisions that occur is country-specific.
All countries receive the lowest or most detailed administrative division - i.e. the 'Province'.

The term 'Province' is used here and refers to the most detailed level of administrative division represented by AND within a country. Due to the large variation in use of this term between countries, it does not always indicate actual provinces as described within a country in its administrative hierarchy. The same is true for the terms 'Region' and 'State'.

Currently, a maximum of 3 administrative levels (below country level) exists in AND's Global Road Data.
For the purpose of this document the most detailed level will be described as the 'Province', the level above this as the 'Region' and the one above this as the 'State' division.



Administrative Division Hierarchy in AND Data

The provision of province, region, state and country information in the AND data varies between and within datasets as the following table illustrates:

Continent	Province Information	Region Information	State Information	Country Information
Europe	eur_p.lst	eur_r.lst	eur_s.lst	eur_c.lst
North America	nam_p.lst	nam_r.lst	Not applicable	nam_c.lst
Central/South America	sam_p.lst	sam_r.lst	Not applicable	sam_c.lst
Australasia	as_p.lst	as_r.lst	Not applicable	as_c.lst
Africa	af_p.lst	af_r.lst	Not applicable	af_c.lst
North Pole	Not applicable	Not applicable	Not applicable	np_c.lst

All '*.lst' files, except _c.lst, have a corresponding '*.num' file that give a total count of the administrative divisions per country.

The format of the '*.num' files is as follows:

Field	Field name	Description
1	Country number	Same number as in *_c.lst
2	Division count	Total number of administrative divisions
3	Division name	Official administrative naming

6.3 Description of the *.lst files

Administrative boundary information in AND data is supplied as a graphical province boundary file and one or more accompanying '*.lst' files.

The following tables describe the field structure of the '*.lst' files at each administrative level:

Field	Province information
1	Nation code
2	Province code (AND assigned)
3	Province Abbreviation/code (Official)
4	Province Name
5	Official number (Germany only)
6	Region code
7	State code

Field	Region information
1	Nation code
2	Region code (AND assigned)
3	Region Abbreviation/code (Official)
4	Region Name

Field	State information
1	Nation code
2	State code (AND assigned)
3	State Abbreviation/code (Official)
4	State Name

Field	Country Information
1	Nation code
2	Nation Abbreviation/code (Official)
3	Nation Name

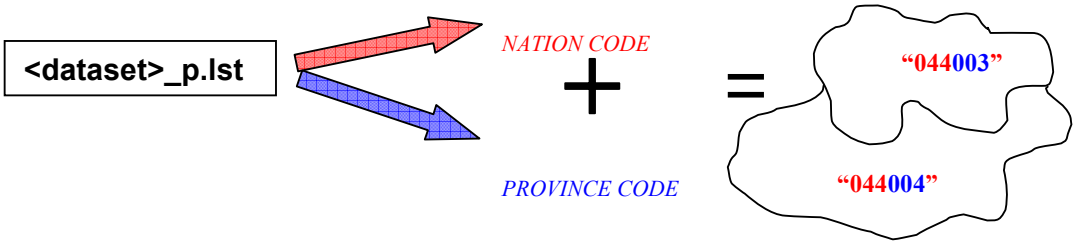
Apart from the <dataset>_c.lst file at country level, the province or '<dataset>_p.lst' file is the only file that can be directly associated with the graphical province boundaries.
The boundaries contain a province code attribute – a six digit figure comprising the nation code (first 3 digits) and province code (last three digits) combined.
This can be used to match the boundaries to their corresponding entry in the <dataset>_p.lst file.

Example :

Europe_p.lst

Nation code	Province code	Province abbr	Name	Region code	State code
044	001	Corn	Cornwall County	001	
044	002	Devon	Devon County	001	
044	003	Dors	Dorset County	001	
044	004	Hants	Hampshire County	002	
044	005	SOM	Somerset County	001	
044	006	Bstol	City Of Bristol	001	
044	007	Wilts	Wiltshire County	001	
044	008	WBerks	West Berkshire	002	
044	009	WSSX	West Sussex County	002	
044	010	ESSX	East Sussex County	002	
044	011	Kent	Kent County	002	

'044003' province code will appear in the AND province boundary data (graphical).
The nation code field and the province code field combined from the <dataset>_p.lst file form the unique identifier for all province boundaries in the AND boundary data.

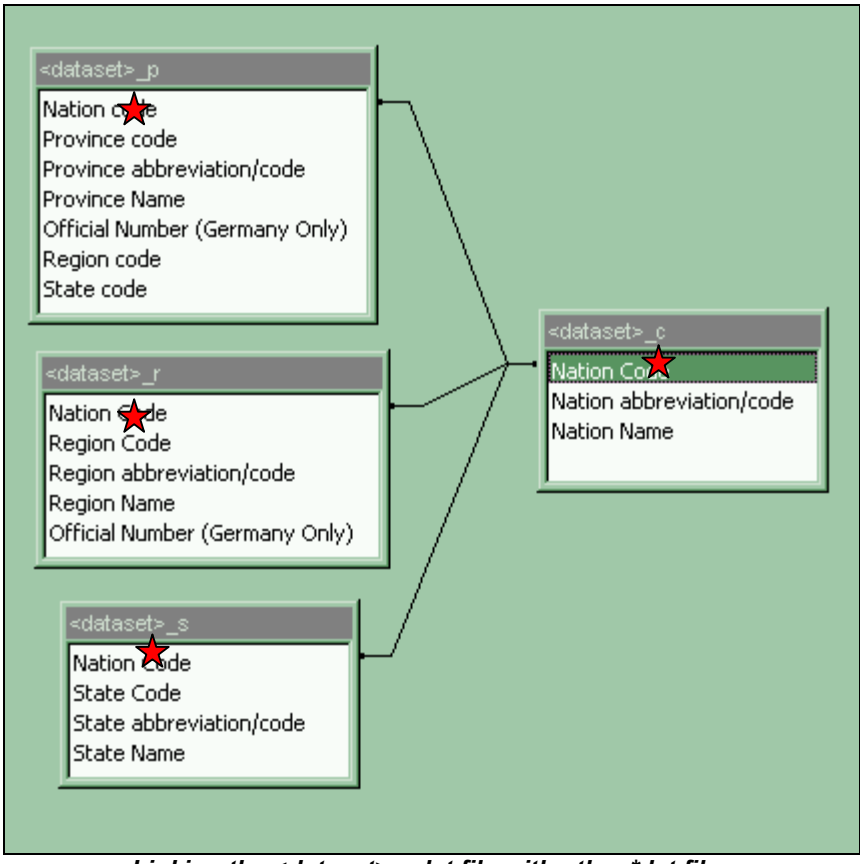


Link between graphical province boundaries and <dataset>_p.lst file

The <dataset>_r.lst file and <dataset>_s.lst file are not directly linked with the graphical data. Instead they provide extra information on the region or state in which each province resides.
The associated region and state for each province is identified in a 'region code' and 'state code' field in the <dataset>_p.lst file. The process by which region or state information can be retrieved and linked to the graphical data is described in the next section.

6.4 Linking and mapping all administrative data

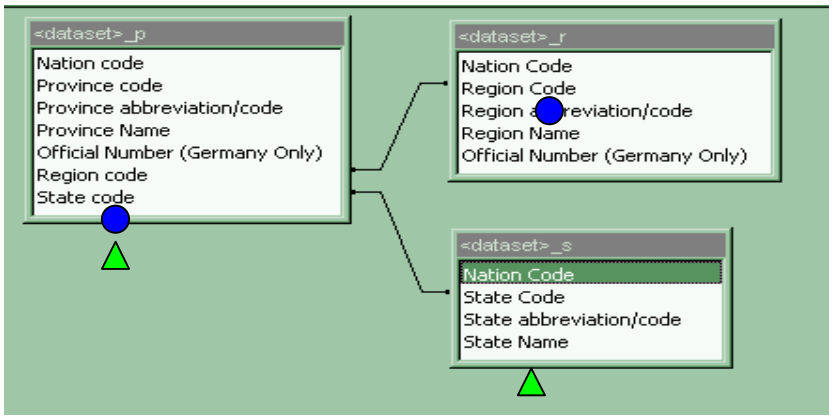
The country or <dataset>_c.lst file can be linked to all other *.lst files as follows:



Linking the <dataset>_c.lst file with other *.lst files

This allows the nation abbreviation and name to be linked to all levels of administrative division.

Because the AND province boundary data is only directly linked to the <dataset>_c.lst and <dataset>_p.lst files, it is necessary for links to exist between the <dataset>_p.lst file, the <dataset>_r.lst and <dataset>_s.lst. This allows all information in all *.lst files to be mapped to the province boundaries. The links are as follows:

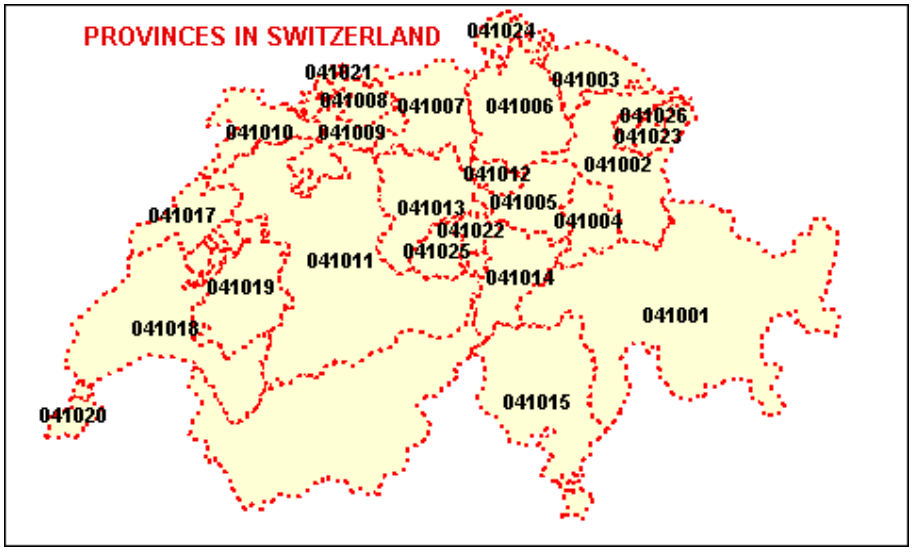


Linking the <dataset>_p.lst file with other* .lst files

6.5 Example of administrative division mapping

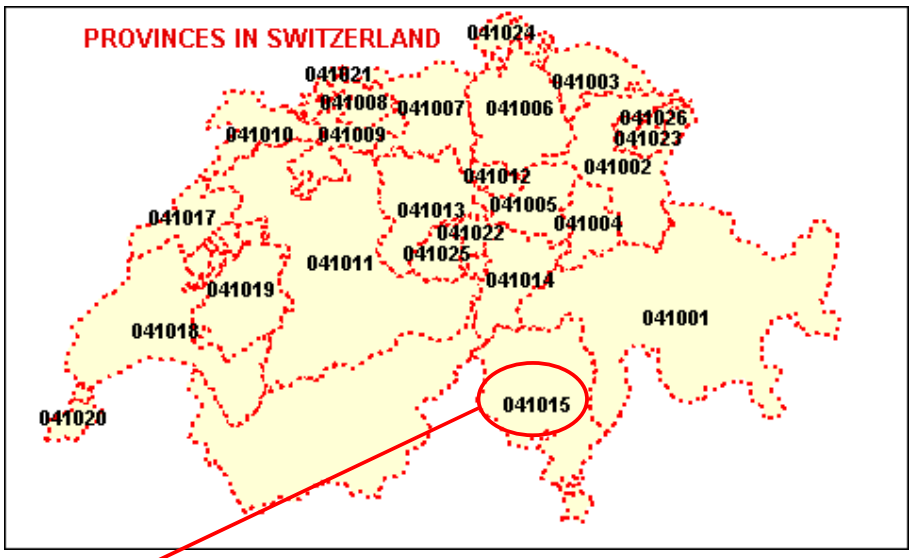
The following example shows how these links can be used to map all administrative information to the province boundary layer.

In Switzerland, there are 2 hierarchical administrative divisions (below Country) – province and region.
There is the AND province boundary data, a <dataset>_p.lst file, a <dataset>_r.lst file and a <dataset>_c.lst file.



Graphical Representation of Province Boundaries in AND GRD

Each province in the AND province boundary data has a 6 digit code. This can be used to link information from the <dataset>_p.lst file. Once this record has been identified, further information in the 'region code' and 'state code' fields can be used to link the <dataset>_r.lst file and <dataset>_s.lst file to the map.



eur_p.lst file

A	B	C	D	E	F
Nation Code	**Province Code**	**Province abbreviation/code**	**Province Name**	**Region Code**	**State Code**
041	015	TI	Ticino	007	NA
041	016	VS	Valais	001	NA
041	017	NE	Neuchâtel	002	NA

eur_r.lst file

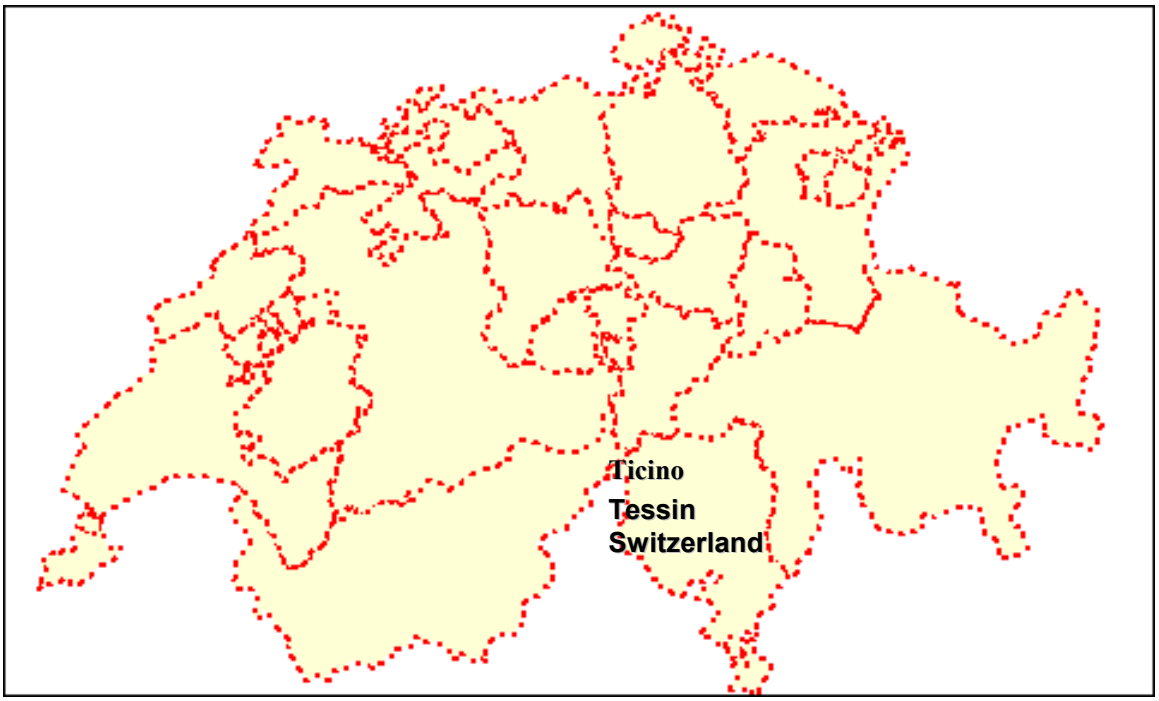
A	B	C	D
Nation Code	**Region Code**	**Region abbreviation/code**	**Region Name**
041	007		Tessin
041	003		Nordwestschweiz
041	001		Genferseeregion
041	002		Espace Mittelland

eur_c.lst file

A	B	C
Nation Code	**Nation abbreviation/code**	**Nation Name**
7	RUS	Russia
30	GR	Greece
31	NL	Netherlands
32	B	Belgium
33	F	France
34	E	Spain
36	H	Hungary
39	I	Italy
40	RO	Romania
41	CH	Switzerland

Mapping Administrative Information using *.lst file links

Using the links between the *.lst file, the province boundaries can then display the following information:



AND Province Boundary display with associated administrative division information

7. Alias format file

The purpose of the alias file is to provide alternative names for named nodes addressable on the administrative level (e.g. cities).

The names are stored in a *.csv format using the following structure:

Field	Field name	Description
1	Xlong	Longitude in decimal degrees
2	Ylat	Latitude in decimal degrees
3	Mode	Always ‘V’ corresponding to “alias name”
4	Lang1-Lang2	The language codes refer to the USMARC Code list for languages
5	Name1	Official language name
6	Name2	Alternative name

