ICE DB XML File Structures

1. Introduction

This document describes the XML file formats used when exporting data into the ICE DB codespace from the Vaisala Birmingham Data Centre.

Exported data is supplied in the Extensible Markup Language (XML) format, a general-purpose, open standard specification for creating custom markup languages. Both observation and forecast data can be exported.

The transfer of XML data to a customer system is by FTP from publically-accessible Vaisala servers or via an http client pull web service.

2. XML Data Format

a. Observation Data

On the next page is an example of XML observation data with the ICE_DB_SENSOR_DATA codespace. Note:

- One file is generated per station is the default. Multiple stations contained within the same file can be delivered if required
- The whole file is defined within the <observation> tag. All other tags are nested within this
- The numerical station ID corresponds with the station name and also forms the first part of the filename
- The station <name> corresponds exactly with the name stored in the Vaisala database
- The <resultOf> tag contains the message date and time as well as the codespace. Multiple timestamps are likely within a single file, depending on the data collection configuration
- The codeSpace is a Vaisala standard called ICE_DB_SENSOR_DATA. Details of which are found at the end of this document in Appendix 1
- The <value no=N> is the sensor number associated with that particular parameter and allows for multiple paramters of the same code
- The <value code> represents the particular parameter taken from the ICE_DB standard. Different stations will report different numbers and types of parameters
- The value itself will be a numerical value. For alphanumeric conversions for parameters such as surface state, see Appendix 2

Note: the codeSpace "ICE_DB_SENSOR_DATA" displayed here applies to the XML files provided via FTP servers. Should the data be provided by the client pull web service, the codeSpace will be ICE_SD instead. Value codes will remain the same.

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<observation version="1.1.0" xmlns="http://www.vaisala.com/iceObsMsg">
    <instance>
        <target>
            <idType>stationId</idType>
            <id>5678</id>
            <name>A111 Boley Park</name>
        </target>
     <resultOf timestamp="20101110T164000" codeSpace="ICE_DB_SENSOR_DATA">
            <value no="1" code="AL">2</value>
            <value no="2" code="AL">2</value>
            <value no="1" code="BI">100</value>
            <value no="2" code="BI">100</value>
            <value no="1" code="CL">3</value>
            <value no="2" code="CL">3</value>
            <value no="1" code="CN">0</value>
            <value no="2" code="CN">0</value>
            <value no="1" code="CS">1.2</value>
            <value no="2" code="CS">0.3</value>
            <value no="1" code="FDS">0</value>
            <value no="1" code="GE">0</value>
            <value no="2" code="GE">0</value>
            <value no="1" code="MST">0</value>
            <value no="1" code="PR">0</value>
            <value no="1" code="PW">0</value>
            <value no="1" code="RD">0</value>
            <value no="1" code="RH">85</value>
            <value no="1" code="RI">0</value>
            <value no="1" code="RS">1</value>
            <value no="1" code="SH">0</value>
            <value no="1" code="SS">7</value>
            <value no="2" code="SS">7.4</value>
            <value no="1" code="ST">5</value>
            <value no="2" code="ST">5</value>
            <value no="1" code="T">2.3</value>
            <value no="1" code="TB">4.8</value>
            <value no="1" code="TD">0.1</value>
            <value no="1" code="TF">0</value>
            <value no="2" code="TF">0</value>
            <value no="1" code="TG">4.5</value>
            <value no="2" code="TG">5</value>
            <value no="1" code="TR">0</value>
            <value no="2" code="TR">0</value>
            <value no="1" code="TS">1.6</value>
            <value no="2" code="TS">2.2</value>
            <value no="1" code="VI">2000</value>
            <value no="1" code="WD">75</value>
            <value no="1" code="WDM">120</value>
            <value no="1" code="WS">0.3</value>
            <value no="1" code="WSM">0.6</value>
            <value no="1" code="WT">0</value>
            <value no="2" code="WT">0</value>
        </resultOf>
    </instance>
</observation>
```

b. Forecast Data

On the next page is an example of XML forecast data with the ICE_DB_FORECAST_DATA codespace. Note:

- One file is generated per station is the default. Multiple stations contained within the same file can be delivered if required
- The whole file is defined within the <forecast> tag. All other tags are nested within this
- The numerical station ID corresponds with the station name and also forms the first part of the filename
- The station <name> corresponds exactly with the name stored in the Vaisala database
- The <resultOf> tag contains the forecast issue date and time as well as the codespace and forecast model used.
- Multiple timesteps will be found to cover the resolution and duration of the forecast. The example on the next page is a truncated 24hr forecast with a 20 minute resolution
- The codeSpace is a Vaisala standard called ICE_DB_FORECAST_DATA. Details of which are found at the end of this document in Appendix 3
- The <value no=N> is the sensor number associated with that particular parameter, usually set as 1 for forecast parameters
- The <value code> represents the particular parameter taken from the ICE_DB standard. Forecast parameters are usually similar if not identical between different forecast providers
- The value itself will be a numerical value. For alphanumeric conversions for parameters such as surface state, see Appendix 4

Note: the codeSpace "ICE_DB_SENSOR_DATA" displayed here applies to the XML files provided via FTP servers. Should the data be provided by the client pull web service, the codeSpace will be ICE_FD instead. Value codes will remain the same.

```xml
<?xml version="1.0"  encoding="UTF-8" standalone="yes"?>
<forecast version="1.1.0" xmlns="http://www.vaisala.com/iceFcastMsg">
<instance>
    <target>
        <idType>stationId</idType>
        <id>5678</id>
        <name>A111 Boley Park </name>
    </target>
    <resultOf forecastModel="Icebreak" codeSpace="ICE_DB_FORECAST_DATA"
issueTime="2012-03-22 11:42:09">
        <timestep timestamp="2012-03-22 12:00:00">
            <value code="CT" no="1">3</value>
            <value code="RS" no="1">0</value>
            <value code="ST" no="1">1</value>
            <value code="T" no="1">14.1</value>
            <value code="TC" no="1">3</value>
            <value code="TD" no="1">2.1</value>
            <value code="TS" no="1">14.5</value>
            <value code="WS" no="1">3.6</value>
        </timestep>
        <timestep timestamp="2012-03-22 12:20:00">
            <value code="CT" no="1">3</value>
            <value code="RS" no="1">0</value>
            <value code="ST" no="1">1</value>
            <value code="T" no="1">14.3</value>
            <value code="TC" no="1">3</value>
            <value code="TD" no="1">2.2</value>
            <value code="TS" no="1">14.7</value>
            <value code="WS" no="1">3.2</value>
        </timestep>
        <timestep timestamp="2012-03-22 12:40:00">
            <value code="CT" no="1">3</value>
            <value code="RS" no="1">0</value>
            <value code="ST" no="1">1</value>
            <value code="T" no="1">14.4</value>
            <value code="TC" no="1">3</value>
            <value code="TD" no="1">2</value>
            <value code="TS" no="1">14.8</value>
            <value code="WS" no="1">3</value>
        </timestep>
……
        <timestep timestamp="2012-03-23 12:00:00">
            <value code="CT" no="1">3</value>
            <value code="RS" no="1">0</value>
            <value code="ST" no="1">1</value>
            <value code="T" no="1">12.6</value>
            <value code="TC" no="1">3</value>
            <value code="TD" no="1">4</value>
            <value code="TS" no="1">13.3</value>
            <value code="WS" no="1">1</value>
        </timestep>
    </resultOf>
</instance>
</forecast>
```

3. FTP Access

Generated XML data files will be made available via publically-accessible FTP servers:

| Primary FTP site | **birice.vaisala.com** | 80.194.86.110 |
| Secondary FTP site | **birice.vaisala.co.uk** | 80.194.88.13 |

A specific user name and password will be supplied per customer.

Once logged the following sub-directories will be available:

| fromvaisala | XML data available for download |
| tovaisala | Data uploaded for Vaisala to process (n/a with a XML feed) |

Navigating into the fromvaisala directory will reveal a number of files that will be named accordingly:
stationID_obs_yyyymmddThhmmss.xml
stationID_fcast_yyyymmddThhmmss.xml

For example:
123_obs_20101117T100000.xml would contain 10.00 data from November 17 2010 for station 123.
5678_fcast_20120309T121453.xml would contain the forecast issued at 12:14:53 on 9th March 2012 station 5678.

As filenames are unique it is recommended that files are deleted following a successful download. If files remain following download they will be periodically deleted from the system to avoid a large build-up.

Details of the which stations the different IDs apply to will be supplied during setup.

4. Appendix 1

ICE_DB_SENSOR_DATA Codespace

ICE_DB code	Definition	Unit
AL	Alarm Status	code*
BI	Black Ice	Hz
BT	Battery Voltage	V
CF	Chemical Factor	%
CL	Cloud State	code*
CLCH[N]	Cloud Height N (vaiable heights)	ft
CLSC[N]	Sky Condition N (variable heights)	octa
CN	Concentration	g/l
CS	Conductivity	
DA	Density Altitude	m
FDS	Visibility Sensor Status	code*
FR	Level of Grip	
GE	Amount of Chemical	g/m2
HCS	DSC sensor status	code *
IL	Ice Layer	mm
MST	General Status	code*
P	Pressure	hpa
PR	Precipitation Total	mm
PR[N]H	Precipitation Total past N hours	mm
PW	Present Weather	code*
RA	Global Radiation	W/m2
RD	Rain on/off	code*
RH	Relative Humidity	%
RI	Rain Intensity	mm/h
RS	Rain State	code*
SH	Snow Height	mm
SL	Snow Layer	mm
SM	Soil Moisture	%
SS	Surface Signal	
ST	Surface State	code*
T	Air Temperature	°C
TB	Base Temperature	°C
TD	Dew Point Temperature	°C
TF	Freezing Temperature	°C
TG	Ground Temperature	°C
TR	Liquid Freezing Temperature	°C
TS	Surface Temperature	°C
VI	Visibility	m

WAC	Water Accumulation	cm
WD	Wind Direction	°
WDM	Max Wind Direction	°
WL	Water Layer	mm
WS	Wind Speed	m/s
WSM	Max Wind Speed	m/s
WT	Water Thickness	mm

It is possible that additional parameters other than those listed may appear for some stations. Please contact Vaisala for clarification should this be the case.

Please note that for parameters that have more than one reporting sensor the syntax of the value will differ change. The no="1" value of the ICE_DB_SENSOR_DATA code denotes sensor number 1. Should multiple road sensors be installed for example, the ICE_DB_SENSOR_DATA code must therefore include multiple 'no=' entries. For example:

ICE_DB no	Definition	Unit
no="1" code="TS"	Surface Temperature (sensor 1)	code*
no="2" code="TS"	Surface Temperature (sensor 2)	code*
no="3" code="TS"	Surface Temperature (sensor 3)	code*

It is possible to have some stations that only report a no="2" or no="3" parameter.

5. Appendix 2

For parameters where a numerical code is used to represent an alphanumeric state, the following conversions apply.

ICE_DB_SENSOR_DATA Conversions

Alarm Status (AL)

Code	Meaning
0	Invalid
1	Unknown
2	Not in use
3	Ice Warning
4	Ice Alarm
5	Frost Warning
6	Rain Warning

Cloud Status (CL)

Code	Meaning
0	No Rain, cloud unknown
1	Cloud and Rain
2	Cloud
3	Clear
4	Invalid

Visibility Sensor Status (FDS)

Code	Meaning
00	visibility ok, hardware ok
01	visibility ok, hardware warning
02	visibility ok, hardware alarm
10	visibility alarm 1, hardware ok
11	visibility alarm 1, hardware warning
12	visibility alarm 1, hardware alarm
20	visibility alarm 2, hardware ok
21	visibility alarm 2, hardware warning
22	visibility alarm 2, hardware alarm

DSC Sensor Status (HCS)

Code	Meaning
00	ok
01	cpu hardware warning
02	transmitter hardware warning
03	data temporarily missing due to excessive light
04	data temporarily missing due to low visibility
10	receiver window contaminated warning
11	receiver window contaminated & cpu hardware warning
12	receiver window contaminated & transmitter hardware warning
13	receiver window contaminated & excessive light warning
14	receiver window contaminated & low visibility warning
20	receiver window heavily contaminated alarm
21	receiver window heavily contaminated & cpu hardware alarm
22	receiver window heavily contaminated & transmitter hardware alarm
23	receiver window heavily contaminated & excessive light alarm
24	receiver window heavily contaminated & low visibility alarm

General Status (MST)

Code	Meaning
0	all OK
1	sensor error

Present Weather (PW)

Code	Meaning
0	Nothing obstructing horizontal visibility
1	Clouds generally dissolving or becoming less developed (during past hour) (not yet used)
2	State of sky generally unchanged (not yet used)
3	Clouds forming or developing (during past hour) (not yet used)
4	Haze, smoke or dust in suspension in the air, visibility >= 1 km

5	Haze, smoke or dust in suspension in the air, visibility < 1 km
10	Mist
11	Diamond dust (not yet used)
12	Distant lightning (not yet used)
18	Squalls (not yet used)
20	Fog was observed during the preceding hour but not at the time of observation
21	Precipitation was observed during the preceding hour but not at the time of observation
22	Drizzle (not freezing) or snow grains was observed during the preceding hour but not at the time of observation
23	Rain (not freezing) was observed during the preceding hour but not at the time of observation
24	Snow was observed during the preceding hour but not at the time of observation
25	Freezing rain or freezing drizzle was observed during the preceding hour but not at the time of observation
26	Thunderstorm with/without precipitation was observed during the preceding hour but not at the time of observation (not yet used)
27	Blowing or drifting snow or sand (not yet used)
28	Blowing or drifting snow or sand, visibility >= 1.0 km (not yet used)
29	Blowing or drifting snow or sand, visibility < 1.0 km (not yet used)
30	Fog
31	Fog or ice fog, in patches
32	Fog or ice fog, has become thinner during the past hour
33	Fog or ice fog, no appreciable change during the past hour
34	Fog or ice fog, has begun or become thicker during the past hour
35	Fog, depositing rime (not yet used)
40	Precipitation
41	Precipitation, slight or moderate
42	Precipitation, heavy
43	Liquid precipitation, slight or moderate
44	Liquid precipitation, heavy
45	Solid precipitation, slight or moderate
46	Solid precipitation, heavy
47	Freezing precipitation, slight or moderate
48	Freezing precipitation, freezing, heavy
50	Drizzle
51	Drizzle, not freezing, slight
52	Drizzle, not freezing, moderate
53	Drizzle, not freezing, heavy
54	Drizzle, freezing, light
55	Drizzle, freezing, moderate
56	Drizzle, freezing, heavy
57	Drizzle and rain mixed, slight
58	Drizzle and rain mixed, moderate or heavy

60	Rain
61	Rain, light
62	Rain, moderate
63	Rain, heavy
64	Rain, freezing, light
65	Rain, freezing, moderate
66	Rain, freezing, heavy
67	Rain (or drizzle) and snow, light
68	Rain (or drizzle) and snow, moderate or heavy
70	Snow
71	Snow, light
72	Snow, moderate
73	Snow, heavy
74	Ice pellets, light
75	Ice pellets, moderate
76	Ice pellets, heavy
77	Snow grains (from WMO 4677)
78	Ice crystals (from WMO 4677)
80	Showers or intermittent precipitation
81	Rain showers, light
82	Rain showers, moderate
83	Rain showers, heavy
84	Rain showers, violent (>32 mm/h)
85	Snow showers, light
86	Snow showers, moderate
87	Snow showers, heavy
89	Showers of hail, with or without rain or rain and snow mixed, not associated with thunder (from WMO 4677)
90	Thunderstorm (TS) (not yet used)
91	Thunderstorm, slight or moderate, no precipitation (not yet used)
92	Thunderstorm, slight or moderate, rain/snow showers (not yet used)
93	Thunderstorm, slight or moderate, hail (not yet used)
94	Thunderstorm, heavy, no precipitation (not yet used)
95	Thunderstorm, heavy, rain or snow showers (not yet used)
96	Thunderstorm, heavy, hail (not yet used)
99	Tornado (not yet used)

Rain on/off (RD)

Code	Meaning
0	Rain not detected
1	Rain detected

Rain State (RS)

Code	Meaning
0	Invalid
1	No Precipitation
2	Recent Precipitation
3	Precipitation now
4	Light Precipitation
5	Medium Precipitation
6	Heavy Precipitation
7	Light Snow
8	Medium Snow
9	Heavy Snow

Surface State (ST)

Code	Meaning
0	Invalid
1	Unknown
2	Short
3	Slushy
4	Dry
5	Moist
6	Wet
7	Wet and Treated
8	Frost
9	Snow
10	Ice
11	Trace of Chemical

6. Appendix 3

ICE_DB_FORECAST_DATA Codespace

ICE_DB code	Definition	Unit
CT	Cloud Type	code*
RS	Rain State	code*
ST	Surface State	code*
T	Air Temperature	°C
TC	Total Cloud Amount	octa
TD	Dewpoint Temperature	°C
TS	Surface Temperature	°C
WS	Wind Speed	m/s

7. Appendix 4

For parameters where a numerical code is used to represent an alphanumeric state, the following conversions apply.

ICE_DB_FORECAST_DATA Conversions

Forecast Cloud Type (CT)

Code	Meaning
0	no cloud
1	low cloud
2	medium cloud
3	high cloud
4	invalid

Forecast Rain State (RS)

Code	Meaning
0	no precipitation
1	light precipitation
2	medium precipitation
3	heavy precipitation
4	light snow
5	medium snow
6	heavy snow
7	invalid

Forecast Surface State (ST)

Code	Meaning
0	unknown
1	dry
2	wet (no precipitation)
3	wet (with precipitation)
4	light dew
5	heavy dew
6	light frost
7	heavy frost
8	ice
9	snow
10	sleep
11	hail
12	damp
13	frost
14	freezing rain

Forecast Total Cloud Amount (TC)

Code	Meaning
0	0 Octas
1	1 Octa
2	2 Octas
3	3 Octas
4	4 Octas
5	5 Octas
6	6 Octas
7	7 Octas
8	8 Octas