Digital NOTAM Workshop

Item 5 - Digital NOTAM Event Specification 2.0

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Content

- Event Specification version 2.0 - overview
- Scenario example

Digital NOTAM concept

Event data

Restricted area North of Sjaellands Odde
TEMPORARY RESTRICTED AREA IS ESTABLISHED
daily from 08:00-17:00 between 07 NOV and 17 NOV
AS FOLLOWS NORTH OF SJAELLANDS ODDE:
560028N 0111656E - 560643N 0111026E - 561500N 0112400E -
561500N 0113600E -560112N 0114736E - 555730N 0113830E - 560028N 0111656E.
between SFC and 60000 FT AMSL
RELEVANT ATS UNITS REF. AIP DENMARK ENR 5.1 ITEM 3:
AARHUS APP/TWR, ACC KOEBENHAVN

Data encoding rules

Data validation rules

NOTAM production rules

Text NOTAM
ICAO Format

(Snnnn/yy NOTAMN

Q) EKDK/QRRCA/IV/BO /W /000/600/5606N01130E012

A) EKDK B) 0711010800 C) 0711011100

E) TEMPORARY RESTRICTED AREA ESTABLISHED

AS FOLLOWS (NORTH OF SJAELLANDS ODDE):

560028N 0111656E - 560643N 0111026E - 561500N 0112400E -

561500N 0113600E -560112N 0114736E - 555730N 0113830E -

560028N 0111656E.

Digital NOTAM

AIXM 5.1 encoded data output

```
<message:AIXMBasicMessage xmlns:message="http://www.aixm.aero/schema/5.1/message" x
    <message:hasMember>
        <event:Event gml:id="e01">
            <event:timeSlice>
                <event:EventTimeSlice gml:id="e01-1">
                    <gml:validTime>
                    <!-- Note that this time should be the same as for the associated feature, see
                        <gml:TimePeriod gml:id="e01-2">
                            <gml:beginPosition>2009-11-07T08:00:00</gml:beginPosition>
                            <gml:endPosition>2009-11-17T17:00:00</gml:endPosition>
                        </gml:TimePeriod>
                    </gml:validTime>
                    <aixm:interpretation>BASELINE</aixm:interpretation>
                    <aixm:sequenceNumber>1</aixm:sequenceNumber>
                    <aixm:featureLifetime>
                        <gml:TimePeriod gml:id="e01-3">
                            <gml:beginPosition>2009-11-07T08:00:00</gml:beginPosition>
                            <gml:endPosition>2009-11-17T17:00:00</gml:endPosition>
                        </gml:TimePeriod>
                    </aixm:featureLifetime>
```
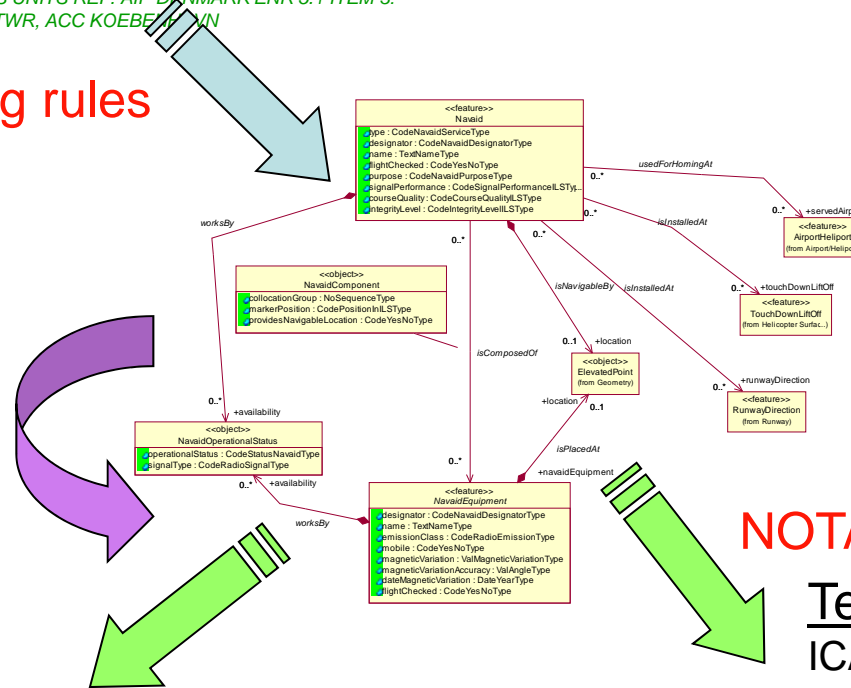
Digital NOTAM Concept

- Coding rules
  - Generic – applicable to all Digital NOTAM encodings
    - Examples: geometry encoding, schedules, estimated end of validity, etc.
  - Specific for each situation
    - Airport closure, Airspace reservation, Navaid unserviceable, Etc.
    - Examples: AIXM feature, type of timeslices, attributes necessary, etc.
  - … same for the data validation rules!

- Decoding (NOTAM text generation)
  - Generic
    - Such as schedules, geometry, etc.
  - Specific to each situation
    - Such as Q code, item E structure, etc.

- Thus naturally leading to « Event Scenarios »

Key principles

- ICAO NOTAM will continue to be published
  - generated from AIXM

    (similarity with AIP/charts generated from a database!)

- Digitisation matches intended use
  - avoid "over-digitisation" !

- Specification will continue to evolve

- Need for data validation
  - will come back later today

Focus Group (2009-2013+)

- NOTAM experts

- EUROCONTROL & FAA

- Service Providers

- End users: airlines, ATC

Incremental approach

Some key features (airspace, airport usage, obstacle etc.) account for 50-70% of the NOTAMs

End users expressed priorities for what NOTAM should become digital first

Incremental implementation !

Candidates for increment 1:
- Airspace and route activation
- Airport runway usage and restrictions
- Obstacles
- SNOWTAM

Scope of "Increment 1"

1. **Airspace activation / reservations / warning areas / CTR** (that are not H24);
   - Justification: up-to-date "airspace activity" charts for VFR community, graphical enhancements to PIB, visualisation for ATC/APP, information provided to the pilot by ATC on request;
2. **Route closures (CDR1, CDR 2, other routes)**;
   - Justification: up-to-date airspace/route availability data for flight planning applications;
3. **Navaid events (all, including ILS)**;
   - Justification: critical data for Airline Operational Centres;
4. **Airport/Runway closures**;
   - Justification: critical data for Airline Operational Centres, graphical enhancements to PIB;

Scope of "Increment 1"

5. **Taxiway closures / work areas**;
   - Justification: graphical enhancements to PIB (identified difficulty – requires static data for Taxiway elements geometry);

6. **Obstacles**;
   - Justification: critical data for Airline Operational Centres, graphical enhancements to PIB;

7. **SNOWTAM**;
   - Justification: critical data for Airline Operational Centres, graphical enhancements to PIB;

8. **All other NOTAM as Text NOTAM associated with the feature**;
   - Justification: completeness of the solution, to avoid digital data users having to also consult text NOTAM from another source.
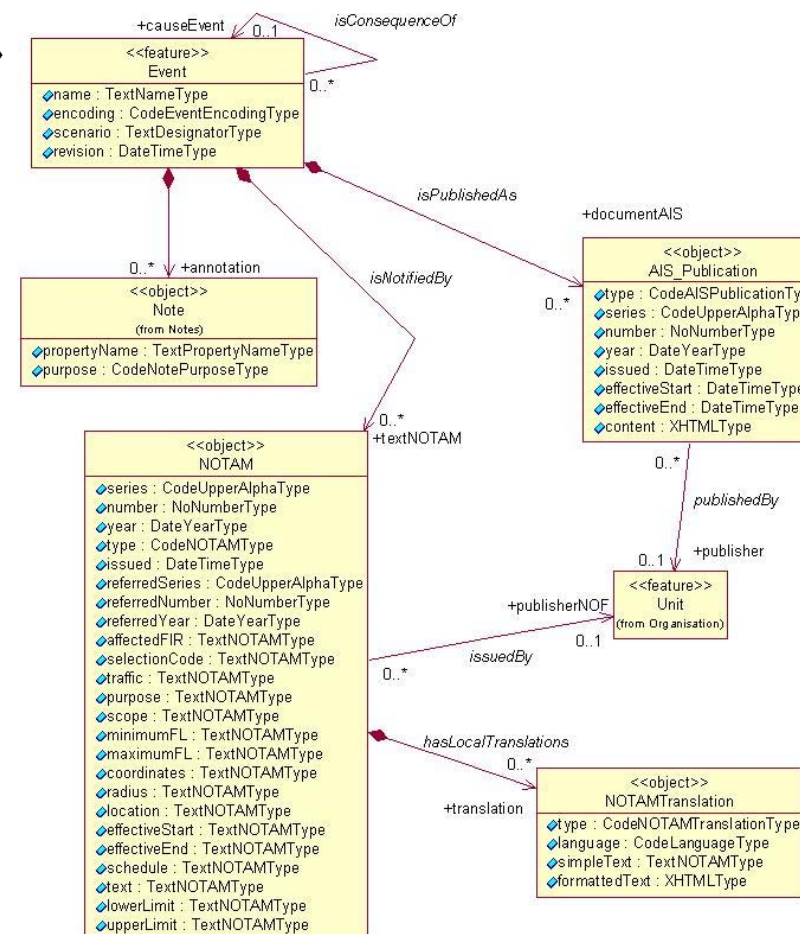
Event Specification 1.0

- Published in June 2011
  - Including 10+1 «proposed scenarios»
  - Intended for test implementations

Thank You!

- Feedback from industry
  - Comsoft, IDS, Thales, Frequentis, SnowflakeSoftware, OGC test bed participants, …

Airport NOTAM – FAA Scenarios

Step by step -> merge into / align with Event Specification

Version 2.0

- New document structure

- Updates to Increment 1 scenarios

- New scenarios

- Alignment with NOTAM Templates

Event Specification 2.0 – main changes

- New structure in 3 parts and 2 appendices
  - ***Part 1 : General***
  - ***Part 2 : Coding Rules***
  - ***Part 3 : Decoding rules (NOTAM production)***
  - ***[Appendix 1] Business Rules***
  - ***[Appendix 2] EBNF (diagrams)***

  - Publication format - consolidated Word document
    - advantage – more internal links (see {{Title}} placeholders)
    - Disadvantage – size 300+ pages
- Not possible to have a detailed change tracking because of a complete re-organisation…
  - Will try later to provide an annotated document

Event Specification 2.0 – main changes

- Part 1 - General
  - General principles – digitisation level to match intended use
  - Common coding rules
    - Character set limitations for notes and instructions
    - Limitation to 250 characters of a note size
    - End of day as 24:00 in digital data (to be converted into "2359" when the NOTAM is automatically generated)
  - Common decoding rules
    - Multi-part NOTAM generation rules
    - More details in the common rules for Q line and items A to G
  - Editorial corrections
    - "coordinate reference system" instead of "datum"

Event Specification 2.0 – main changes

- Part 2 – Coding
- Structure
  - No separation between Increments
  - Try grouping together events that refer to the same area, in the following order
    - Airspace, Route, Navaids, Obstacles, Airport,…
- Corrections – refinements of Increment 1, very few!
  - SAA.NEW – type is optional so that it can also accommodate "navigation warnings"
  - AD.CLS, RWY.CLS – clarification of some coding rules for exceptions
  - OTHER event – clarification of its purpose
    - for situations that do not have a dedicated scenario
    - minimal digital encoding
    - support ICAO NOTAM text generation

Event Specification 2.0 – main changes

- Part 3 – Decoding
  - Structure
    - Same order as in the Coding document
  - Corrections – refinements of Increment 1
    - All scenarios
      - aligned with the NOTAM Templates document, when available
      - more guidelines for generating line Q and item A
    - SAA.ACT, SAA.NEW
      - two different templates for item E (aligned with the NOTAM templates document), separate for P, D, R, TRA, TSA versus Navigation Warnings
      - adjustments of some terms used in the NOTAM text (such as "UAS" instead of "UAV")
    - ATSA.NEW
      - vertical limits are now in item E (instead F and G)
    - RTE.OPN, RTE.CLS
      - no significant changes

Event Specification 2.0 – main changes

- Part 3 – Decoding
- Corrections – refinements of Increment 1
    - AD.CLS, RWY.CLS
        - More precise criteria for Q code generation
        - Split the item E pattern in smaller pieces to improve readability
        - Re-ordered some elements and adjusted some terms
    - Etc.

Content

- Scenario example

SAA.ACT Scenario definition

- Special Activity Airspace activation
- Activation of a pre-existing restricted, dangerous, prohibited, or reserved etc. airspace
- Notes
  - "special activity area" = P, D, R and similar areas
  - Includes activation of airspace with changes to vertical altitude limits beyond normal published limits
    - Does *not* include changes horizontal limits that are normal as published
  - Does *not* include the permanent modification of a SAA area
  - Does include de-activation of an active SAA area
  - Does *not* include CTR and other ATS airspace

Examples

- **TRA EAR23 active**
  - E) TEMPORARY RESERVED AREA EAR23 DONLON EAST ACTIVE, MILITARY EXERCISE. FOR FURTHER INFORMATION PLEASE CONTACT DONLON ACC ON PHONE (12)123 45 67.

- **EGD128 active above normal level**
  - E) DANGER AREA EGD128 EVERLEIGH ACTIVE. CHANGED VERTICAL LIMITS DURING ACTIVATION.
  - F) SFC G)2000FT AMSL

- *LFD186 changed activity*
  - E) DANGER AREA LFD186 CAMP DE SOUGE ACTIVE, UNMANNED ACFT SYSTEM ACTIVITIES. AREA ACTIVATION WITH CHANGES IN HOURS AND TYPE OF ACTIVITY. PHONE CAMP DE SOUGE : +33 5 56 68 40 46 .
    INFO : AQUITAINE APP : 118.600MHZ ATIS BORDEAUX MERIGNAC : 131.150MHZ MERIGNAC TWR : 118.300MHZ.
    COMPULSORY BYPASS FOR EVERY ACFT EXCEPT ACFT PERFORMING EMERGENCY OR PUBLIC SAFETY MISSION WHEN BYPASS IS NOT POSSIBLE.
    SERVICES PROVIDED : ALERT INFO TO AUTHORIZED ACFT.

Event data

optional   *optional*   *optional*

type → designator → name → activation status

start time → end time → schedule *optional*

activity type *optional*

lower limit → upper limit *optional*

optional, multiple → End

note

AIXM Mapping

<<object>>
PropertiesWithSchedule
(from Schedules)

schedule

isActive

<<feature>>
Airspace

- type : CodeAirspaceType
- designator : CodeAirspaceDesignatorType
- localType : TextNameType
- name : TextNameType
- designatorICAO : CodeYesNoType
- controlType : CodeMilitaryOperationsType
- upperLowerSeparation : ValFLType

type

name

designator

+contributorAirspace

0..1

+activation

0..*

<<object>>
AirspaceActivation

- activity : CodeAirspaceActivityType
- status : CodeStatusAirspaceType

activity type

note

activation status

<<object>>
AirspaceGeometryComponent

- operation : CodeAirspaceAggregationType
- operationSequence : NoSequenceType

hasGeometry

dependsOn

<<object>>
AirspaceVolumeDependency

- dependency : CodeAirspaceDependencyType

concerns

+levels   0..*

+geometryComponent   0..*   0..*

<<object>>
AirspaceLayer
(from Airspace Layer)

- upperLimit : ValDistanceVerticalType
- upperLimitReference : CodeVerticalReferenceType
- lowerLimit : ValDistanceVerticalType
- lowerLimitReference : CodeVerticalReferenceType
- altitudeInterpretation : CodeAltitudeUseType

FLOOR - CEILING

<<object>>
AirspaceVolume

- upperLimit : ValDistanceVerticalType
- upperLimitReference : CodeVerticalReferenceType
- maximumLimit : ValDistanceVerticalType
- maximumLimitReference : CodeVerticalReferenceType
- lowerLimit : ValDistanceVerticalType
- lowerLimitReference : CodeVerticalReferenceType
- minimumLimit : ValDistanceVerticalType
- minimumLimitReference : CodeVerticalReferenceType
- width : ValDistanceType

upper limit

lower limit

1

hasBoundary

+horizontalProjection   0..1

<<object>>
Surface
(from Geometry)

Rules – data encoding

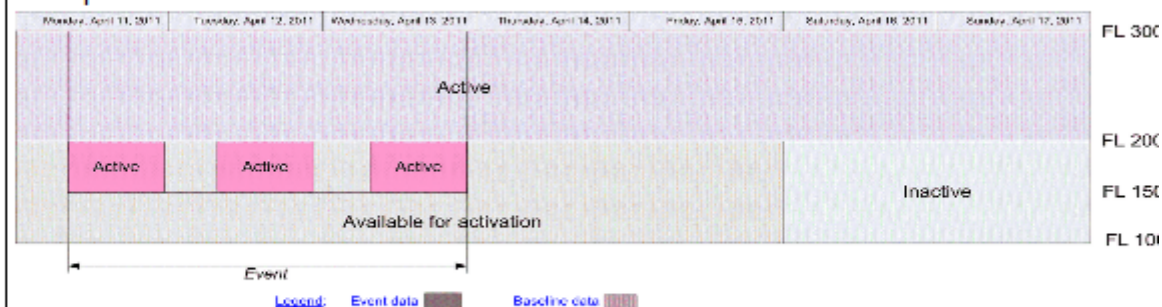| Identifier	Data encoding rule
ER-01	The activation of an airspace shall be encoded as: • a new Event (encoding="DIGITAL", scenario="SAA.ACT", version="2.0"), for which PERMDELTA and subsequent BASELINE TimeSlice shall be created; and • a TimeSlice of type TEMPDELTA for the corresponding Airspace feature, for which the "event:theEvent" property points to the Event instance created above; the TEMPDELTA shall contain one or more AirspaceActivation objects.
ER-02	If the whole airspace becomes active, from floor to ceiling, then the Airspace TEMPDELTA should use the values "FLOOR, uom=OTHER" for lowerLimit and "CEILING, uom=OTHER" for the upperLimit of the AirspaceLayer associated with the AirspaceActivation.
ER-03	Only the following values shalle be used for the AirspaceActivation.status • ACTIVE • IN_USE • INTERMITTENT
ER-04	If the airspace becomes active below its nominal lower limit or above its nominal upper limit (as defined in the Airspace BASELINE), then the Airspace TEMPDELTA TimeSlice shall include both: • the appropriate upper/lower limit values inside the AirspaceLayer associated with the AirspaceActivation, and • the AirspaceGeometryComponents with the modified upper and/or lower limits.
ER-05	If the area activation is limited to a discrete schedule within the overall time period between the "start time" and the "end time", then this shall be encoded using as many as necessary timeInterval/Timesheet properties for the AirspaceActivation of the Airspace TEMPDELTA Timeslice. See the encoding rules for {{Schedules}}.

Rules – data encoding

ER-06	In accordance with the AIXM Temporality Concept (see sections 3.4 and 3.5 in version 1.0), the AirspaceActivation associated with the TEMPDELTA completely replaces all the BASELINE AirspaceActivation information, during the TEMPDELTA time of applicability. Therefore, if the activation only concerns certain times and/or levels, the other times and/or levels, when the airspace eventually remains with the same status as in the Baseline data, shall be explicitly included in the TEMPDELTA. The calculation of the necessary additional AirspaceActivation elements to be included in the TEMPDELTA shall be automatically done by the applications implementing this specification. All AirspaceActivation elements that are copied from the BASELINE data for completeness sake shall get an associated Note with purpose=REMARK and the text="Baseline data copy. Not included in the NOTAM text generation". This is based on the current NOTAM practice which consists of including in the NOTAM only the changed information and not explicitly including the static data that remains valid during the NOTAM applicability. It is recommended that the input interface provides a "calendar/level" view of the airspace activation, enabling the operator to graphically check the status of the airspace activation at different times and levels, such as in the example below: In the calendar view, the Baseline information that remains valid during the Event validity time shall be visibly identified from the information that is specific to the Event, for example by using a different colour fill pattern.

Rules – data encoding

ER-07	If the BASELINE Airspace has a type different from P (Prohibited) and the information received from the originator indicates that the area is "prohibited", "compulsory bypass", "no fly zone" or equivalent during its activation, then the Airspace TEMPDELTA TimeSlice shall also modify the Airspace type="P". This shall be done even if the prohibition concerns only certain flights, aircraft types, a part of the airspace, etc. This will facilitate the automatic detection of partially or totally prohibited areas by data users. Some might require manual interpretation of the detailed information provided as Notes. In the data provider HMI, this should be supported with a check-box - "Area is prohibited for certain flights". When this box is checked, the application would automatically set the type to P. The check box should only be enabled for Airspace that have the Baseline type different from "P".
ER-08	If a specific activity is indicated in the input data, this shall be encoded in the Airspace TEMPDELTA TimeSlice. The activity types that do not match a pre-defined CodeAirspaceActivityType value shall be encoded as follows: • captive balloon -> activity=OTHER:CAPTIVE_BALLOON • kite activities -> activity=OTHER:KITE • demolition using explosive devices -> activity=OTHER:DEMOLITION • mass movement of aircraft ->activity=OTHER:ACFT_MASS_MOVEMENT • aerial survey / photogrammetic flights -> activity=OTHER:AERIAL_SURVEY • flying in formation -> activity=OTHER:ACFT_FORMATION • model flying -> OTHER:MODEL

NOTAM production – Q code

BL.type	TD.AirspaceActivation.activity (if not specified, refer to BL.AirspaceActivation.activity)	Recommended Q code
P	any	QRPCA
R	any	QRRCA
D	any	QRDCA
TSA	any	QRRCA or QRTCA
TRA	any	QRRCA or QRTCA
W	any	QRRCA
D-OTHER, A or OTHER	AERIAL_WORK, OTHER:AERIAL_SURVEY, CROP_DUSTING, HI_RADIO	QRDCA
D-OTHER, A or OTHER	none specified	QRDCA
D-OTHER, A or OTHER	AIRSHOW	QWALW
D-OTHER, A or OTHER	SPORT, AEROBATICS	QWBLW
D-OTHER, A or OTHER	EXERCISE, NAVAL_EXER, TRAINING, JET_CLIMBING	QWELW
D-OTHER, A or OTHER	REFUEL	QWFLW
D-OTHER, A or OTHER	GLIDING	QWGLW
D-OTHER, A or	BLASTING, WATER_BLASTING	QWHLW

Event Data Template

type (optional)	designator	Name (optional)	activation status
R = restricted	R736AB	Townsville Airspace	active

start activation	end activation	schedule (optional)
13 JUN 23:00	01 JUL 08:00	Daily 23:00-08:00

activity type (optional)
military operations

lower level (optional)	upper level (optional)
FLOOR	CEILING

Note (optional)
no note

```xml
<timeSlice>
  <AirspaceTimeSlice gml:id="AS01_TS01">
    <gml:validTime>
      <gml:TimeInstant gml:id="AS01_TS01_TI01">
        <gml:timePosition>2010-06-12T08:13:00</gml:timePosition>
      </gml:TimeInstant>
    </gml:validTime>
    <aixm:interpretation>SNAPSHOT</aixm:interpretation>
    <aixm:type>R</aixm:type>
    <aixm:designator>R736AB</aixm:designator>
    <aixm:name>TOWNSVILLE AIRSPACE R736AB</aixm:name>
    <geometryComponent>
      <AirspaceGeometryComponent gml:id="APGC01">
        <operation>BASE</operation>
        <operationSequence>1</operationSequence>
        <theAirspaceVolume>
          <AirspaceVolume gml:id= ASV01">
            <upperLimit uom="FL">420</upperLimit>
            <upperLimitReference>MSL</upperLimitReference>
            <lowerLimit uom="FT">0</lowerLimit>
            <lowerLimitReference>SFC</lowerLimitReference>
            <horizontalProjection>
              <Surface gml:id="SURFACE01">
                <gml:patches>
                  <gml:PolygonPatch>
                    <gml:exterior>
                      <gml:LinearRing>
                        <gml:pos>38 -119</gml:pos>
                        <gml:pos>39 -119</gml:pos>
                        <gml:pos>39 -118</gml:pos>
                        <gml:pos>38 -117</gml:pos>
                      </gml:LinearRing>
                    </gml:exterior>
                  </gml:PolygonPatch>
                </gml:patches>
              </Surface>
            </horizontalProjection>
          </AirspaceVolume>
        </theAirspaceVolume>
      </AirspaceGeometryComponent>
```
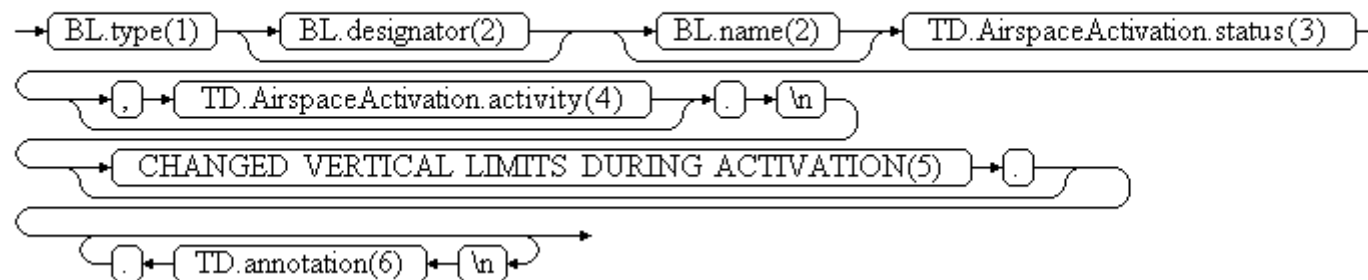
```xml
    <interpretation>TEMPDELTA</interpretation>
    <sequenceNumber>6</sequenceNumber>
    <activation>
      <AirspaceActivation gml:id="AA01">
        <timeInterval>
          <Timesheet gml:id="AA01_TS01">
            <timeReference>UTC</timeReference>
            <startDate>13-06</startDate>
            <endDate>01-07</endDate>
            <day>ANY</day>
            <startTime>00:00</startTime>
            <endTime>08:00</endTime>
            <daylightSavingAdjust>YES</daylightSavingAdjust>
          </Timesheet>
        </timeInterval>
        <timeInterval>
          <Timesheet gml:id="AA01_TS02">
            <timeReference>UTC</timeReference>
            <startDate>13-06</startDate>
            <endDate>01-07</endDate>
            <day>ANY</day>
            <startTime>23:00</startTime>
            <endTime>24:00</endTime>
            <daylightSavingAdjust>YES</daylightSavingAdjust>
          </Timesheet>
        </timeInterval>
        <activity>MILOPS</activity>
        <status>ACTIVE</status>
        <aixm:levels>
          <aixm:AirspaceLayer gml:id="AL01">
            <aixm:upperLimit uom="OTHER">CEILING</aixm:upperLimit>
            <aixm:lowerLimit uom="OTHER">FLOOR</aixm:lowerLimit>
          </aixm:AirspaceLayer>
        </aixm:levels>
        <user xlink:href="urn:faa:gov:nasr:6bdb97aa-3f04-41bc-ac10-64cede76b4da" xlink:title=
      </AirspaceActivation>
    </activation>
  </AirspaceTimeSlice>
</timeSlice>
```
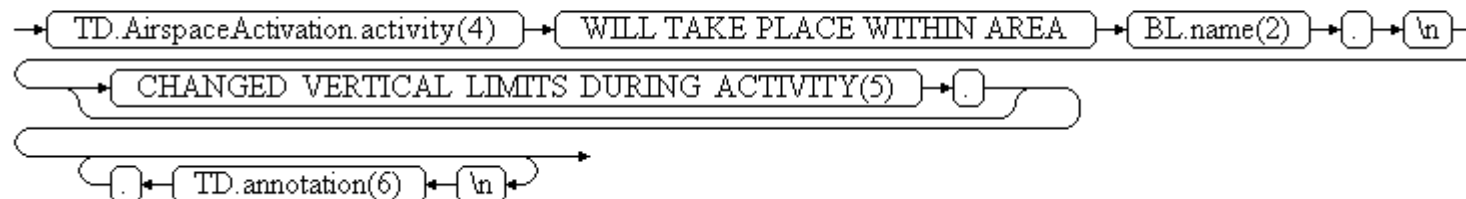
NOTAM production – E field

Airspace type = P, R, D, TSA, TRA, W

template_1

Airspace type any other than P, R, D, TSA, TRA, W

template_2

A0001/14 NOTAMN
Q)EADL/QRRCA/IV/BO/W/000/420/5221N00745W050
A)EADL
B)1406132300 C)1407010800
D)DAILY 0000-0800 2300-2359
E)RESTRICTED AREA R736AB TOWNSVILLE ACTIVE,
MILITARY OPERATIONS.
F) SFC G) FL420

Digital NOTAM encoding – findings

Some current AIS practices that are not aligned with the digital world

- order of points on an airspace border, which is typically clockwise on paper/NOTAM and counter-clockwise for digital data

- end of day, which is 23:59 in NOTAM and 24:00 in digital data

- use of arc by center point versus arc by edge

- included/excluded vertical limits for an airspace, does it really make sense to use margins of 1ft?

- operational hours of an aerodrome versus the fact that there is no such field in the static data and AIP

- Etc.

Event Specification 2.0 – current status

- SAA.ACT
- ATSA.ACT
- SAA.NEW
- ATSA.NEW
- RTE.OPN
- RTE.CLS
- NAV.UNS
- OBS.NEW
- OBL.NEW
- AD.CLS
- RWY.CLS
- RWE.CLS
- TWY.CLS
- THR.CHG
- RWD.CHG
- ALS.UNS
- ALS.LIM

- VAS.UNS
- RWL.UNS
- TWL.UNS
- SFC.CON
- VOLC.WRN
- OTHER

Event Specification 2.0 - Next steps

- **Final public review before release**
  - All green scenarios – until end June
  - All orange scenarios – until end July
    - Will become green in June!
  - Comments directly in GoogleDocs

- **Business rules (appendix 2) will require more time**
  - First priority – finalise the general AIXM 5.1 Business Rules review
  - Digital NOTAM specific rules in the second wave, end 2014

Thank you!

- Contact details
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