



AIXM

The Aeronautical Information Exchange Model

Kanishk Chaturvedi

Lehrstuhl für Geoinformatik
Technische Universität München

kanishk.chaturvedi@tum.de

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Introduction

- ▶ AIXM is a specification to support aeronautical information collection, dissemination and transformation
- ▶ It consists of two major components
 - ▶ The AIXM Conceptual Model (UML)
 - ▶ Describes the features and their properties within the aeronautical domain
 - ▶ The AIXM XML Schema
 - ▶ Implementation of the Conceptual Model as an XML schema
 - ▶ Used as an exchange model for aeronautical data

Features of AIXM Version 5

- ▶ A temporality model (AIXM 5.1)
- ▶ Alignment with ISO standards for geospatial information, including GML
- ▶ Use of UML as conceptual schema language
- ▶ Support for latest industry and ICAO (International Civil Aviation Organization) requirements for aeronautical data

Digital NOTAM

- ▶ Digital NOTAM (**Notice(s) to Airmen**) is the way of handling of temporary values in a structured manner to enable automated processing
- ▶ For example:
 - Instead of
`<text>TAXIWAYS OUTER 7 AND E6 CLSD</text>`
 - use explicit feature properties
`<taxiway>
 <name>OUTER 7</name>
 <status>CLOSED</status>
</taxiway>
<taxiway>
 <name>E6</name>
 <status>CLOSED</status>
</taxiway>`

Temporality Model

► Definition

- A model that incorporates the concept of time at feature level

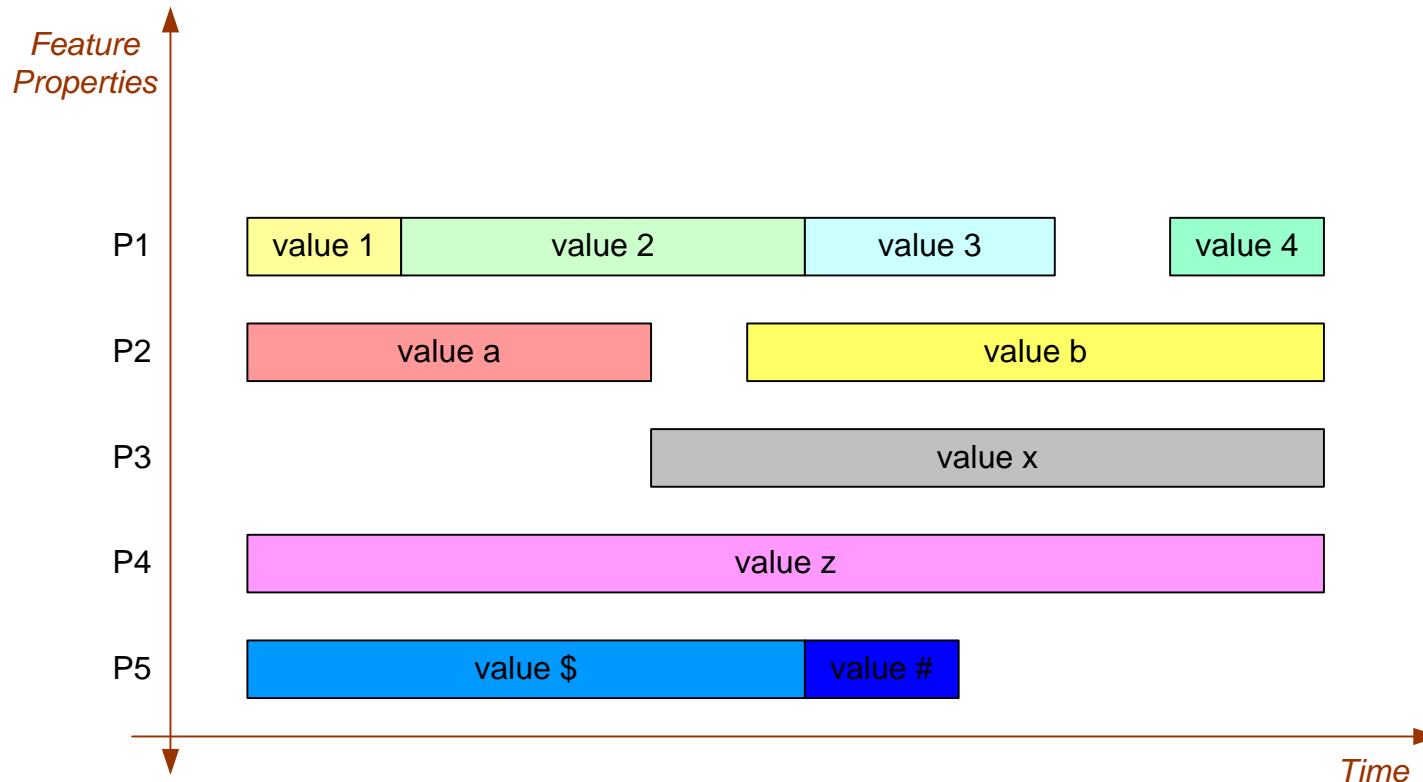
► Key assertion

- All features are temporal from start of life until end of life
- All features can change over time
- Additional issue: feature properties can have different values according to a repetitive schedule

► AIXM Temporality Model

- Relates feature properties to the time extent in which they are valid

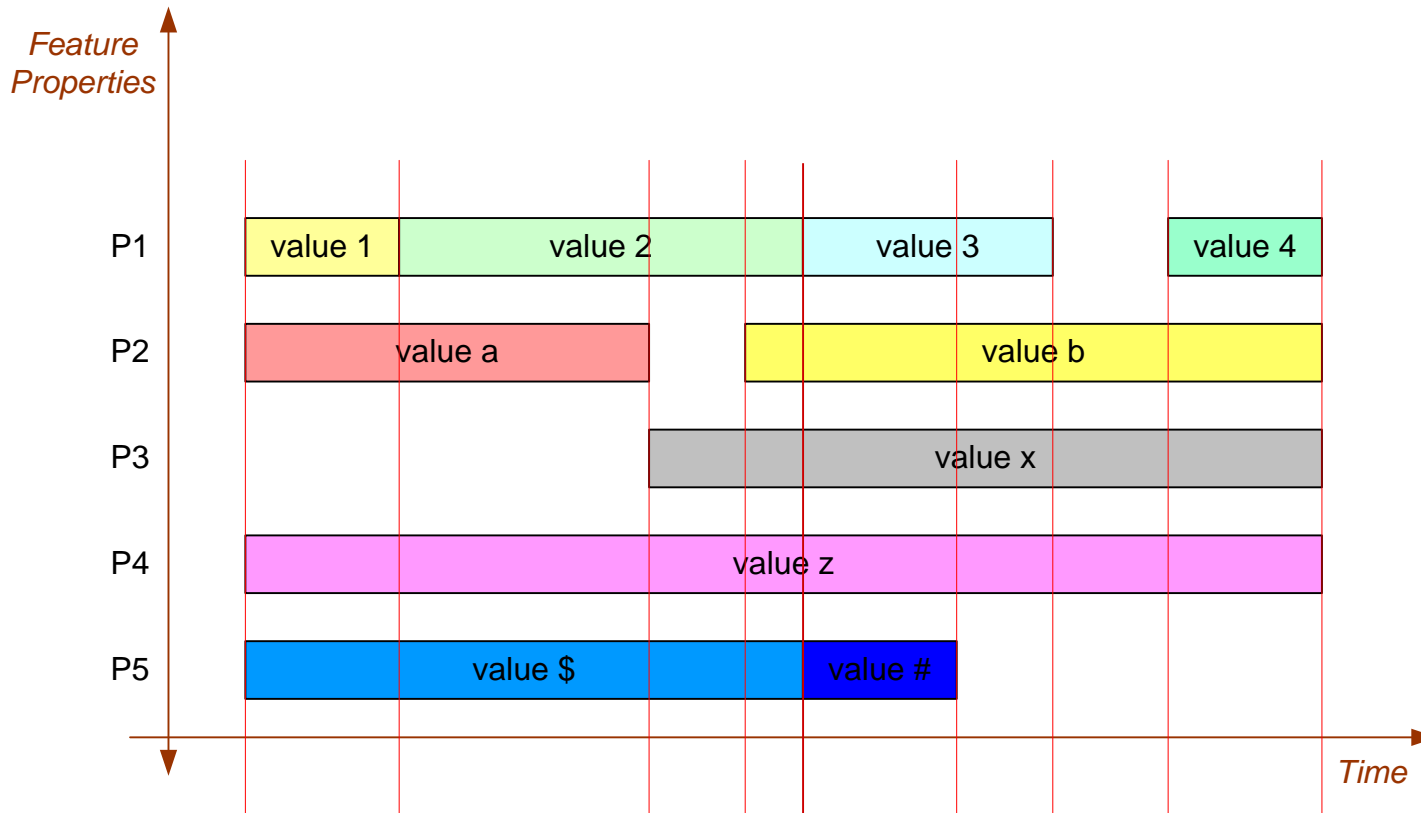
Step 1 – Time varying properties of features



- The first step is to show the values of a feature's properties along a timeline

Source : AIXM 5 Temporality Model

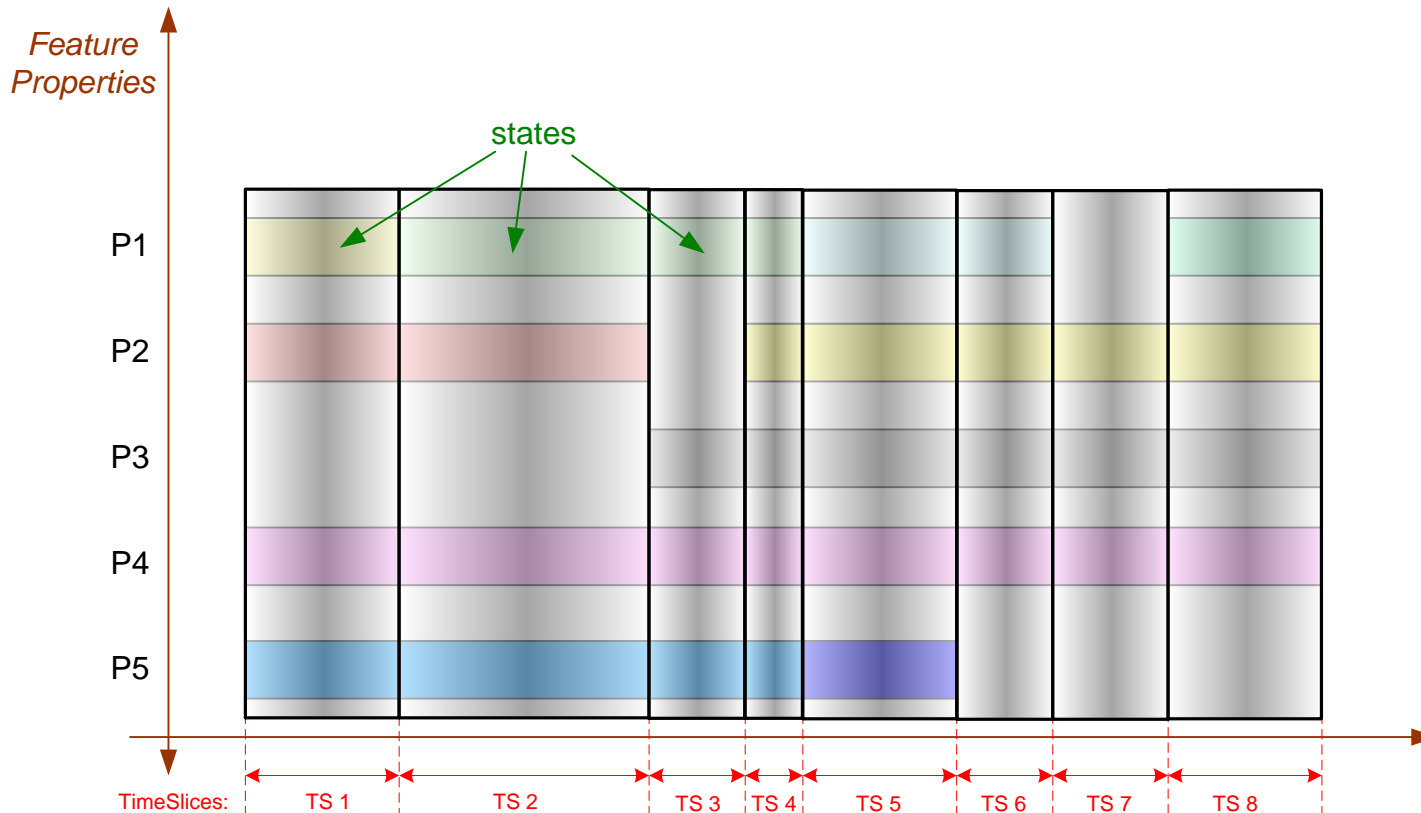
Step 2 – The basic Time Slice Model



- Times, where properties change, are marked with vertical lines. The vertical lines are called 'Events'.

Source : AIXM 5 Temporality Model

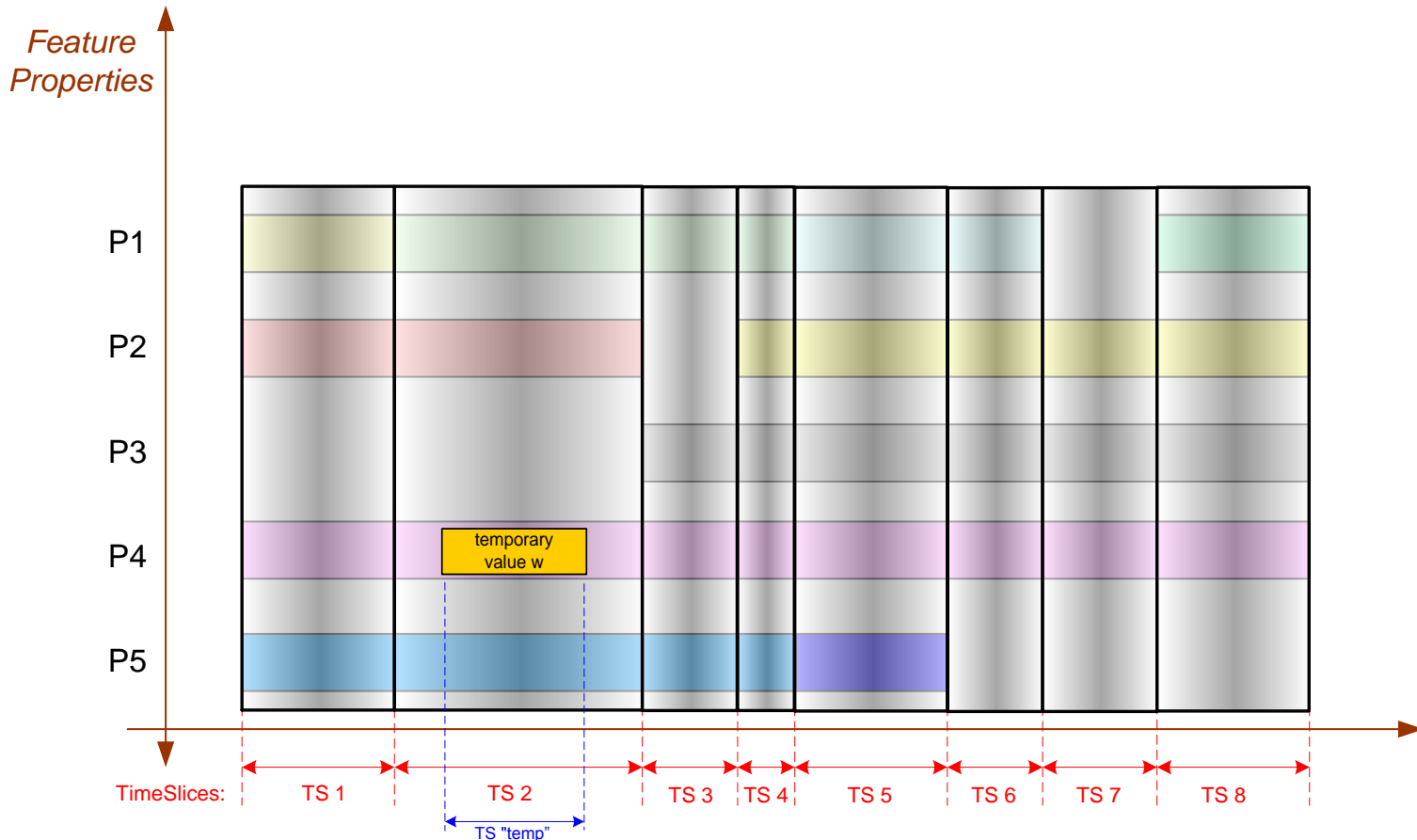
Step 2 – The basic Time Slice Model



- Each timeslice describes feature properties during a state and event

Source : AIXM 5 Temporality Model

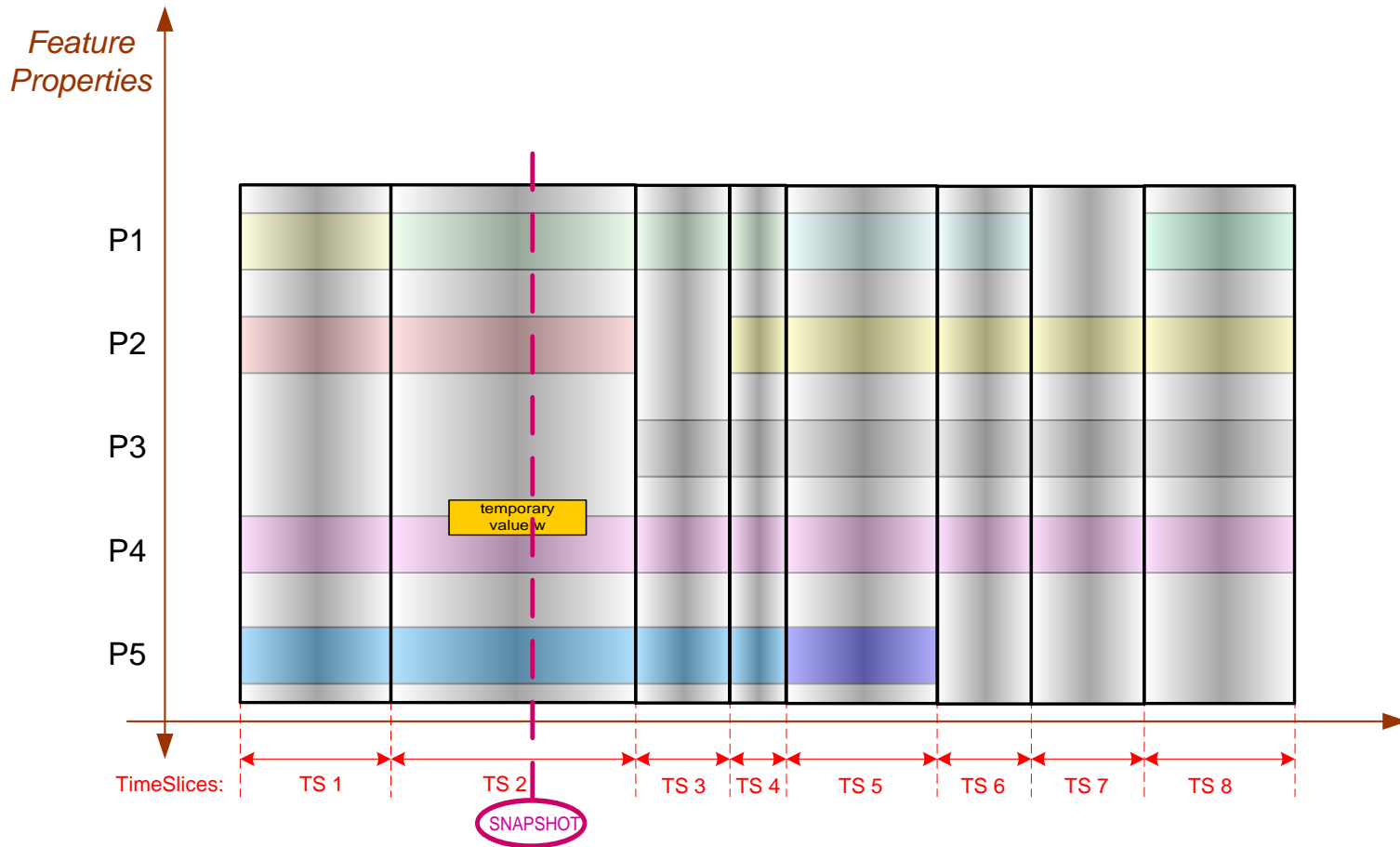
Step 3 – Temporary Events (Digital NOTAM)



- Temporary value is modelled as an overlay on permanent value.

Source : AIXM 5 Temporality Model

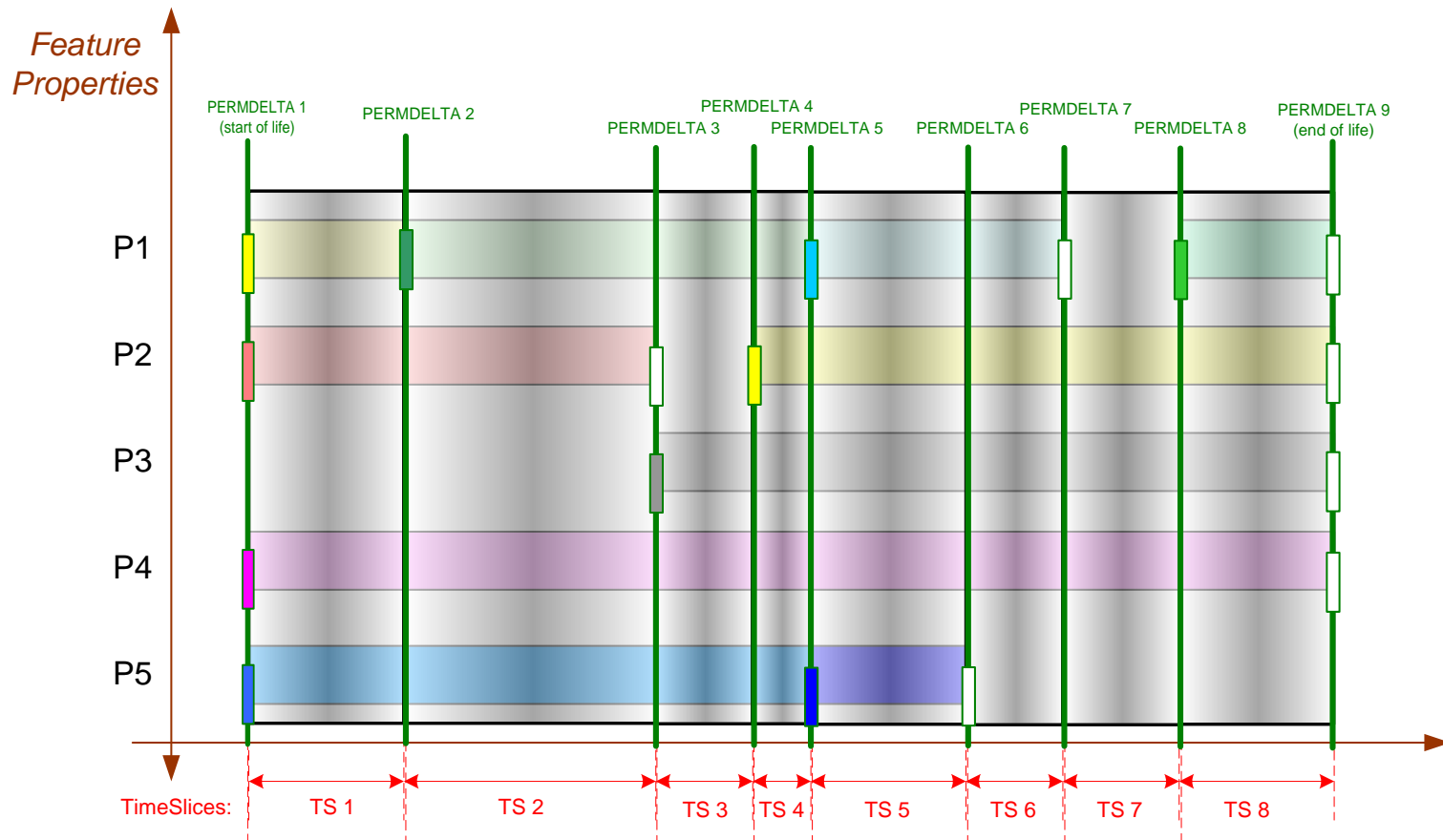
Step 4–Current Status (SNAPSHOT Time Slices)



- ▶ SNAPSHOT carries the result of merging the baseline information with overlaying temporary value at a specific moment of time.

Source : AIXM 5 Temporality Model

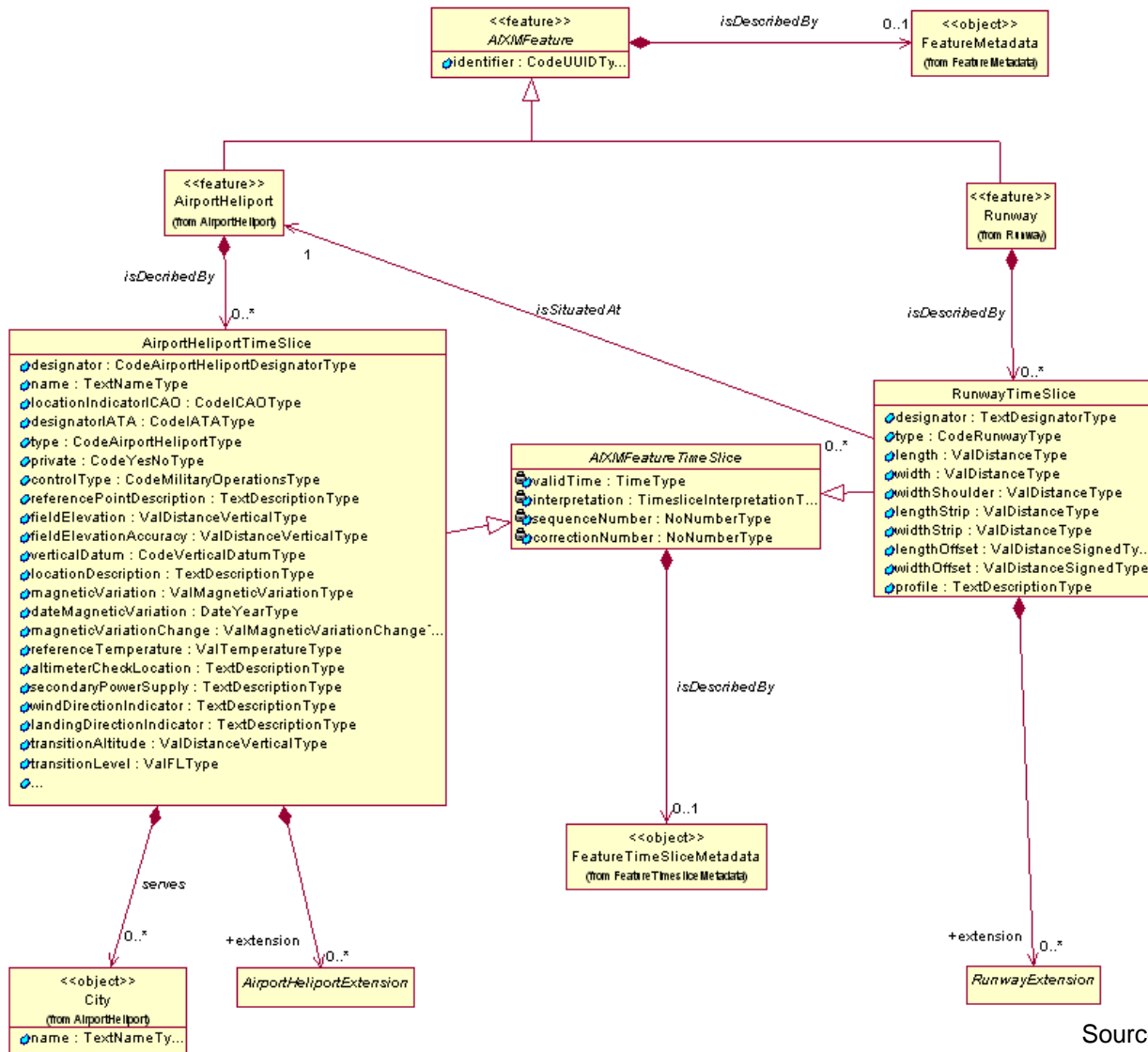
Step 5 – PERMDELTA Time Slices



- PERMDELTA is the difference between two consecutive baselines.

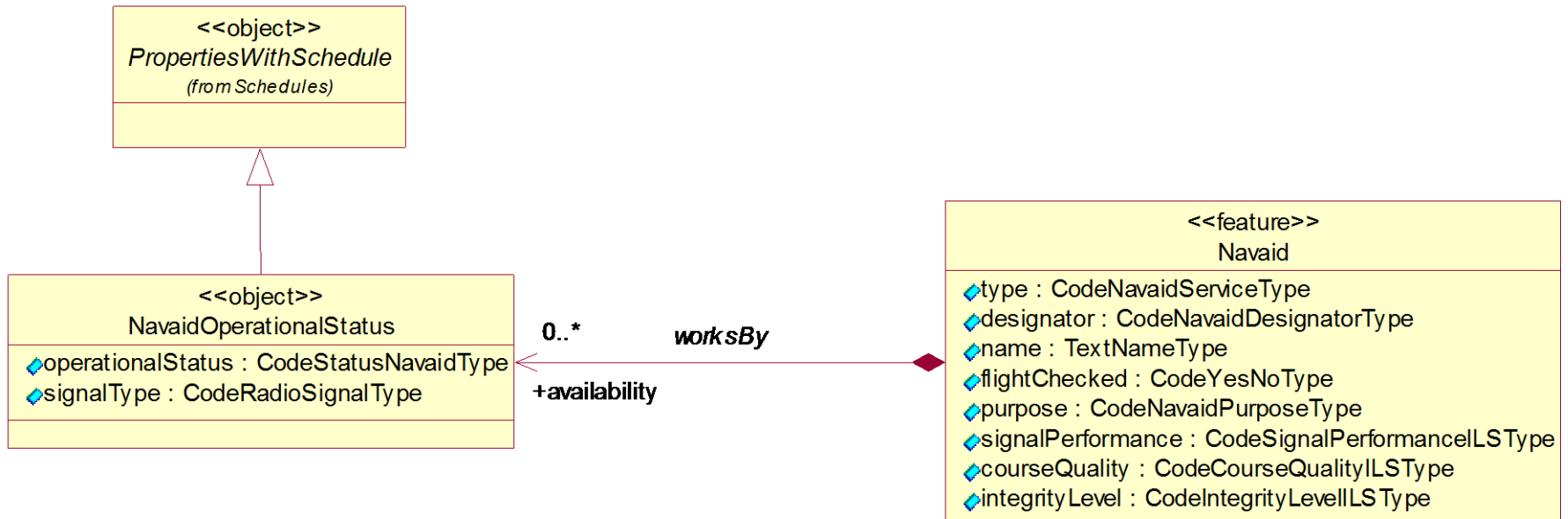
Source : AIXM 5 Temporality Model

Temporality applied to the abstract model



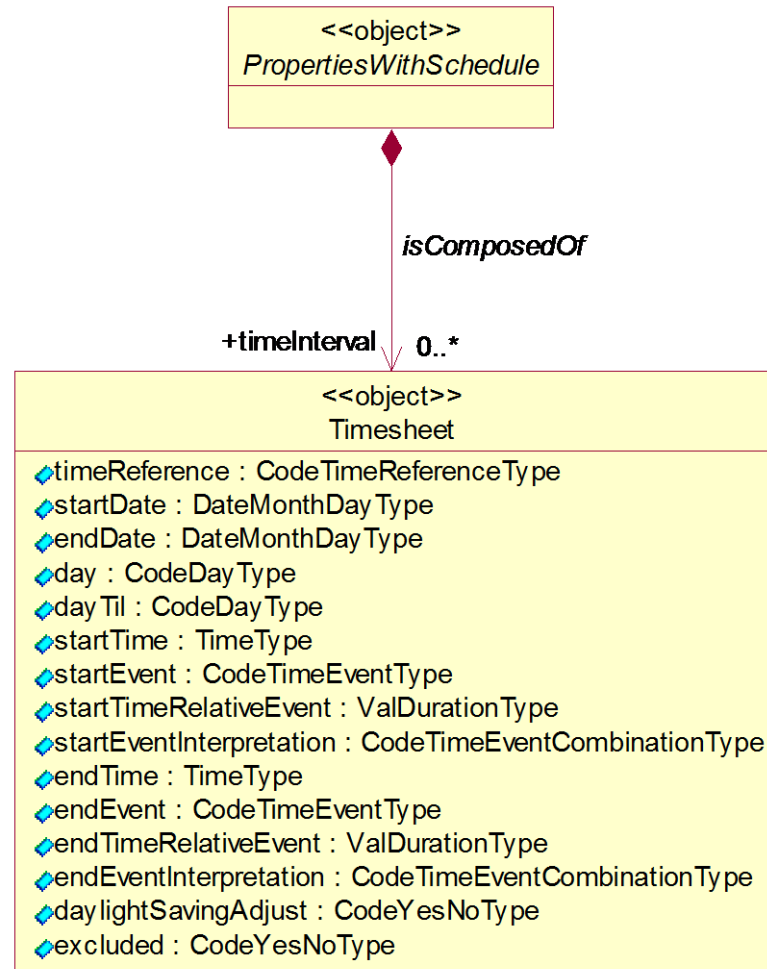
Source : AIXM 5 Temporality Model

Properties with schedule



- ▶ The idea is to associate the properties that have cyclic varying values with a Timesheet that describes the times when each value is applicable.

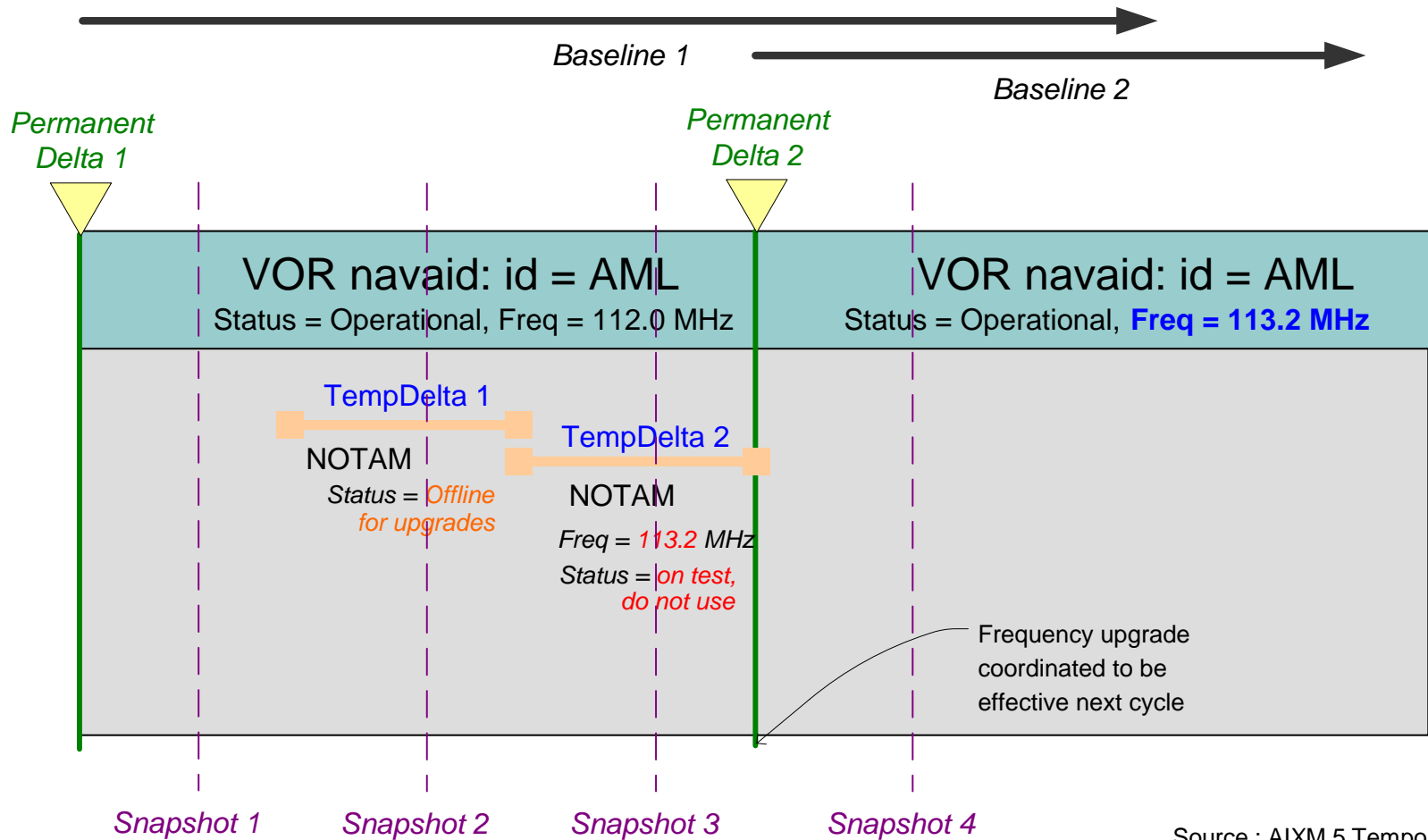
Properties with schedule



Source : AIXM 5 Temporality Model

An Example: Navaid frequency change

AML Navaid undergoes an upgrade that changes its frequency from 112.0 MHz to 113.2 MHz...



Source : AIXM 5 Temporality Model

Reference

- ▶ Aeronautical Information Exchange Model (AIXM), AIXM 5 Temporality Model, September 2010, www.aixm.aero

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Additional Slides

Example - Recommendations

► Start of life

Feature

gml:identifizier

TimeSlice

- validTime = timeInstant...
- *interpretation* = *PERMDelta*
- sequenceNumber = 1
- featureLifetime/beginPosition = same timeInstant...
- property 1
- property 2
- property 3
- property 4
-

TimeSlice

- validTime = timeInterval with undetermined end
- *interpretation* = *BASELINE*
- sequenceNumber = 1
- featureLifetime/beginPosition = same timeInstant...
- property 1
- property 2
- property 3
- property 4

Example - Recommendations

► Permanent Changes

TimeSlice

- validTime = timeInstant...
- *interpretation* = *PERMDelta*
- sequenceNumber = 2
- property 3 (new value)
- property 5 (new value)

TimeSlice

- validTime = timeInterval with undetermined end ...
- *interpretation* = *BASELINE*
- sequenceNumber = 2
- featureLifetime/beginPosition = timeInstant...
- property 1
- property 2
- property 3 (new value)
- property 4
- property 5 (new value)

Example - Recommendations

► Temporary Change (Digital NOTAM)

Feature

gml:identifier

TimeSlice

- validTime = timeInterval...
- *interpretation* = *TEMPDELTA*
- sequenceNumber = 1
- property 4 (temporary value)

Example - Recommendations

► End of life

Feature

`gml:identifier`

TimeSlice

- validTime = timeInstant...
- *interpretation* = *PERMDelta*
- sequenceNumber = 3
- featureLifetime/endPosition = same timeInstant...

TimeSlice

- validTime = timeInterval with the end as specified by the *PERMDelta*
- *interpretation* = *BASELINE*
- sequenceNumber = 2
- *correctionNumber* = 1
- featureLifetime/beginPosition = timeInstant...
- featureLifetime/endPosition = timeInstant, as specified by the *PERMDelta*
- property 1
- property 2
- property 3
- property 4
- property 5