APAC FF-ICE Ad hoc Group Workshop with TTX

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Flight Information Exchange Model

—

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ATS Message: Overview

- ATS Messages are used to share flight plans including flight movements between AUs and ANSPs

- Format is teletype and defined in PANS-ATM (DOC 4444)

```
(FPL-ABC123-IS
-A320/M-SDE1E2FGHIRWY/LB1
-ADEP0655
-N0460F340 SABIS Y8 SAVSA
-ADES0103 ALTN
-PBN/A1B1C1D1L1O1S2 DOF/240529 REG/HSXXXX SEL/FKCH CODE/123456 PER/C
RMK/TCAS)
```

```
(DEP-ABC123/A4414-ADEP0650-ADES-DOF/240529)
```

```
(ARR-ABC123/A4414-ADEP0655-ADES0750)
```

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ATS Message: Limitation

- It is difficult to change
  - Requires ICAO process

- Some extra information are not machine-to-machine readable.

- In AFTN, a message is limited to 4,000 characters

- Identifying the flight related to a message needs the combination of
  - aircraft identification
  - departure aerodrome
  - destination aerodrome
  - date of flight
  - and estimated off-block time (EOBT)

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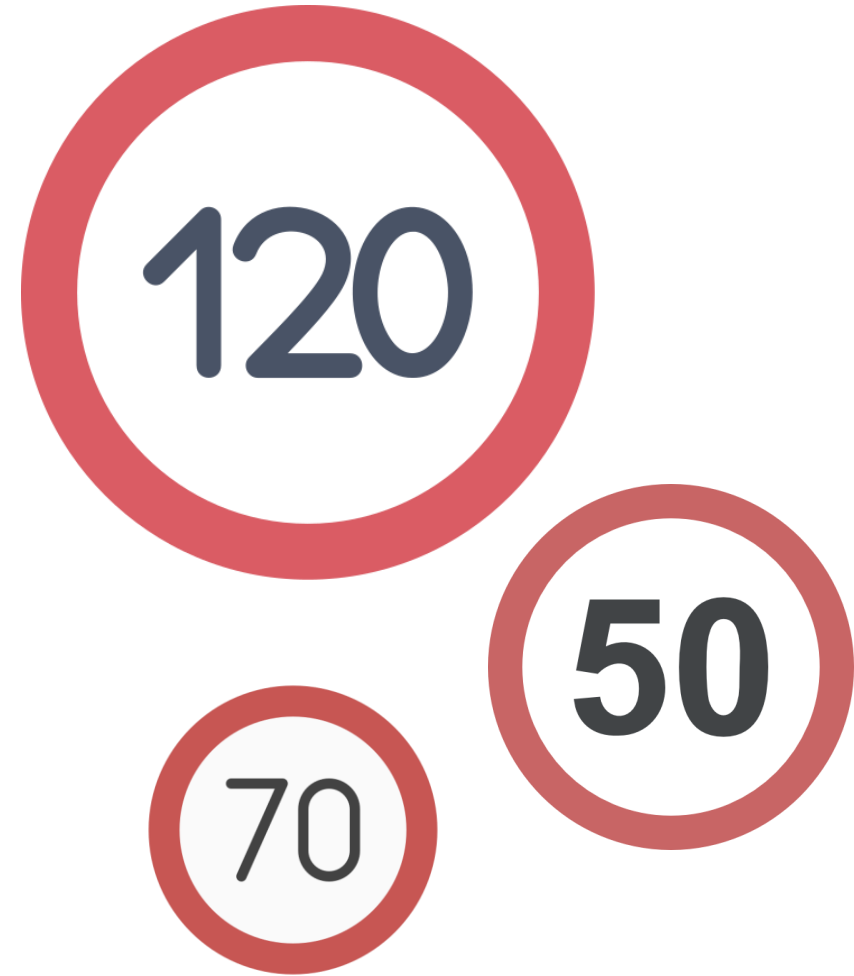
FIXM: Overview

- Stands for Flight Information Exchange Model

- Globally standard exchange model for capturing Flight and Flow information

- Uses the eXtensible Markup Language (XML) standard

- The FIXM Change Control Board (CCB) provides change management

- Current Version: FIXM 4.3.0

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```xml
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<fx:Flight xmlns:fb="http://www.fixm.aero/base/4.2" xmlns:ffice="http://www.fixm.aero/app/ffice/1.0
  <fx:aircraft>
    <fx:aircraftAddress>885315</fx:aircraftAddress>
    <fx:aircraftType>
      <fx:type>
        <fx:icaoAircraftTypeDesignator>A320</fx:icaoAircraftTypeDesignator>
      </fx:type>
    </fx:aircraftType>
    <fx:capabilities>
      <fx:communication>
      <fx:navigation>
      <fx:standardCapabilities>STANDARD</fx:standardCapabilities>
      <fx:surveillance>
    </fx:capabilities>
    <fx:registration>HSTXU</fx:registration>
    <fx:wakeTurbulence>M</fx:wakeTurbulence>
  </fx:aircraft>
  <fx:arrival>
    <fx:actualTimeOfArrival>2024-05-30T10:26:00Z</fx:actualTimeOfArrival>
    <fx:destinationAerodrome>
      <fb:locationIndicator>VTBS</fb:locationIndicator>
    </fx:destinationAerodrome>
    <fx:destinationAerodromeAlternate>
      <fb:locationIndicator>VTBD</fb:locationIndicator>
    </fx:destinationAerodromeAlternate>
  </fx:arrival>
  <fx:departure>
    <fx:aerodrome>
      <fb:locationIndicator>VTSP</fb:locationIndicator>
    </fx:aerodrome>
    <fx:estimatedOffBlockTime>2024-05-30T09:05:00Z</fx:estimatedOffBlockTime>
  </fx:departure>
  <fx:extension xmlns:q1="http://www.fixm.aero/ext/apac/4.2" xsi:type="q1:ApacAircraftTrackType">
  <fx:flightIdentification>
    <fx:aircraftIdentification>THA216</fx:aircraftIdentification>
  </fx:flightIdentification>
  <fx:flightType>S</fx:flightType>
  <fx:gufi codeSpace="urn:uuid">307d7cb4-7c93-44ae-b4f2-6c1027d9271e</fx:gufi>
  <fx:gufiOriginator>
    <fb:name>AEROTHAI</fb:name>
  </fx:gufiOriginator>
  <fx:remarks>TCAS </fx:remarks>
  <fx:routeTrajectoryGroup>
    <fx:filed>
      <fx:element seqNum="0">
        <fx:elementStartPoint>
          <fb:designatedPoint>
            <fb:designator>EMRIT</fb:designator>
          </fb:designatedPoint>
        </fx:elementStartPoint>
        <fx:routeDesignatorToNextElement>
          <fx:routeDesignator>Y99</fx:routeDesignator>
        </fx:routeDesignatorToNextElement>
      </fx:element>
      <fx:element seqNum="1">
```

FIXM: Component

The main FIXM Components are

- FIXM Core provides globally harmonized flight data structures.

- FIXM Application provides messaging related data structures and reuse and restrict relevant subsets of the FIXM Core (2) and FIXM Extension structure (3).

- FIXM Extension provides additional flight data structures exchanged locally and regionally and used to supplement FIXM Core (1) and FIXM Application (2).

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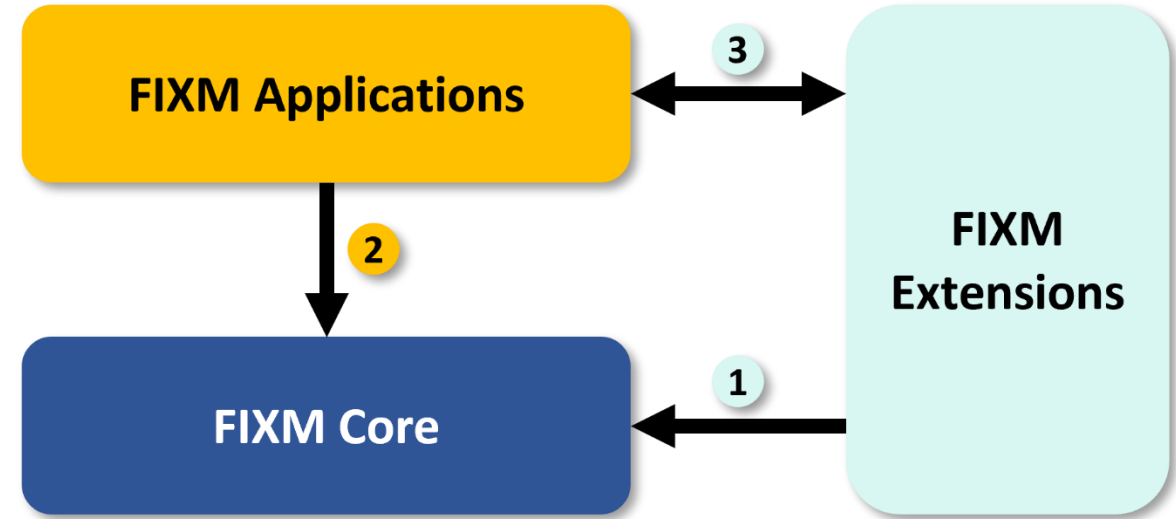
FIXM: FIXM Core

- Globally harmonized flight data structures that can be exchanged in various contexts
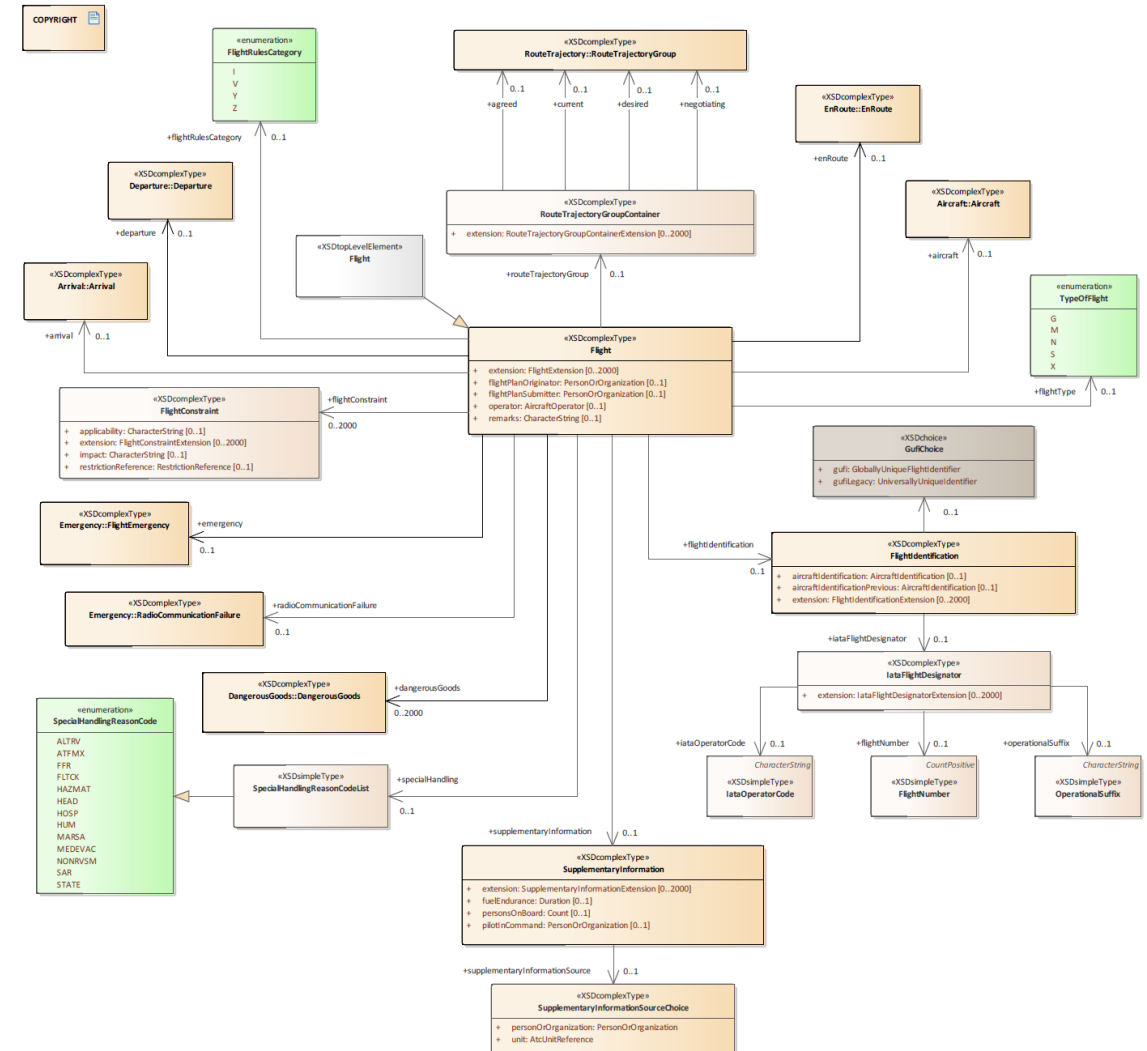
FIXM: FIXM Application

- Addresses the use of FIXM Core in a given context

- Provides context-specific message data structures and message templates

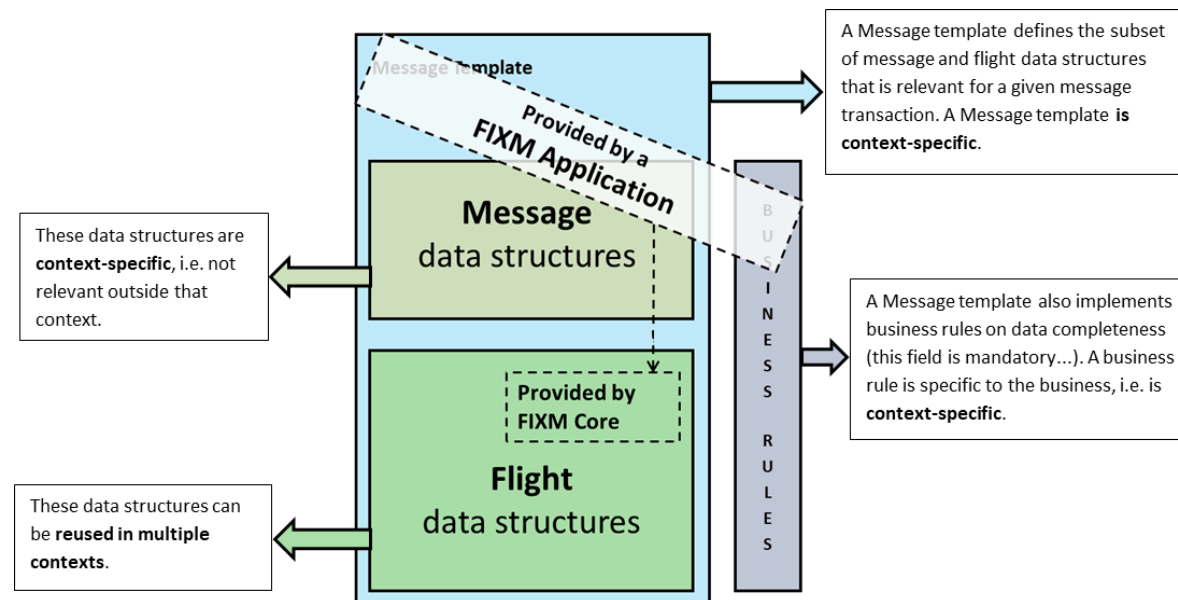- Currently, there are 2 FIXM Applications
  - Basic Message
    - Provides basic messaging support for FIXM
  - FF-ICE Message
    - Provides support FF-ICE message transactions

A Message template defines the subset of message and flight data structures that is relevant for a given message transaction. A Message template **is context-specific**.

These data structures are **context-specific**, i.e. not relevant outside that context.

A Message template also implements business rules on data completeness (this field is mandatory...). A business rule is specific to the business, i.e. is **context-specific**.

These data structures can be **reused in multiple contexts**.

Message template

Provided by a FIXM Application

Message data structures

Provided by FIXM Core

Flight data structures

BUSINESS RULES

FIXM: FF-ICE Message

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- Encapsulates FIXM Core within the FF-ICE Message

- Includes ALL fields required in all FF-ICE/R1 Services
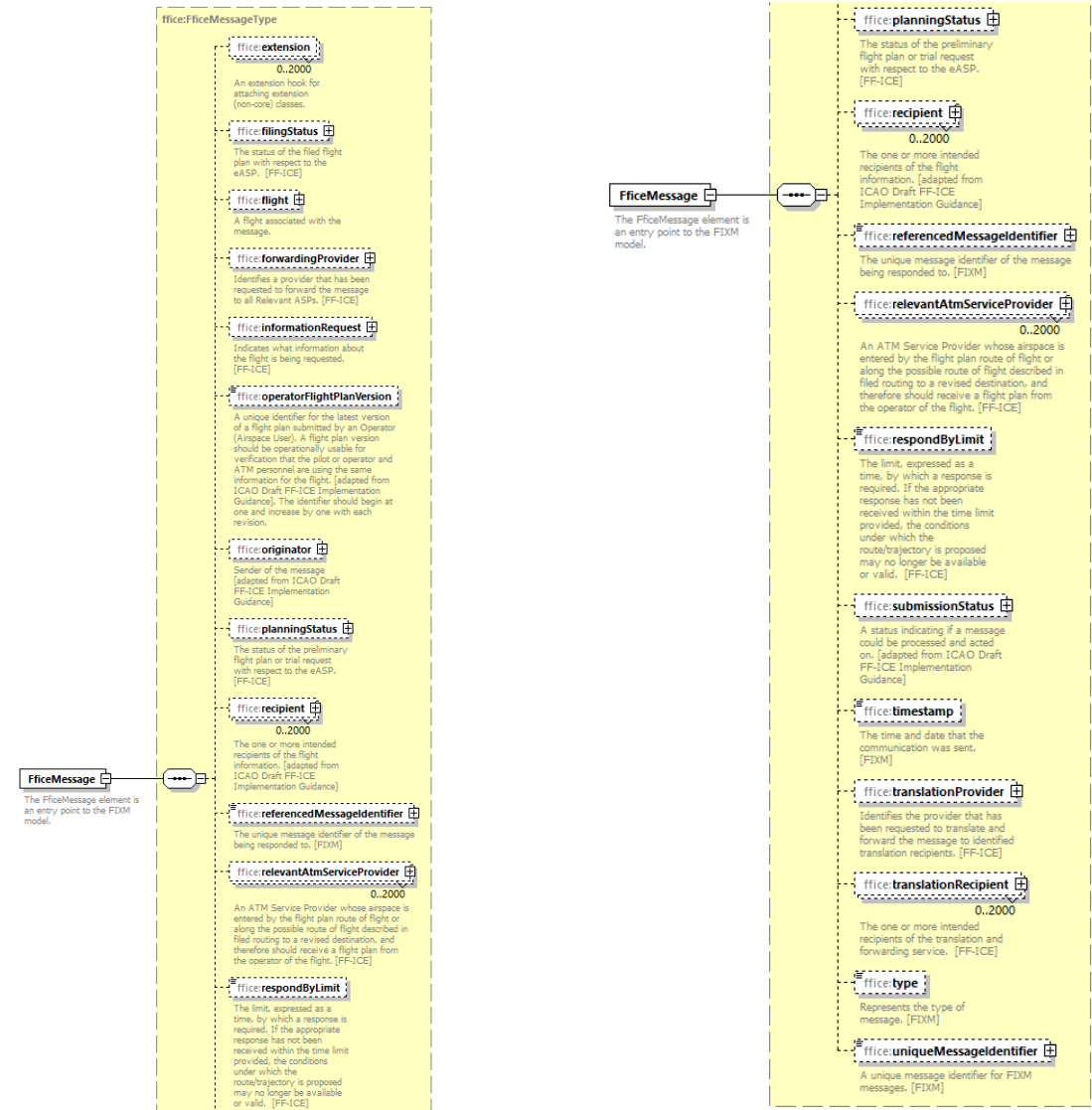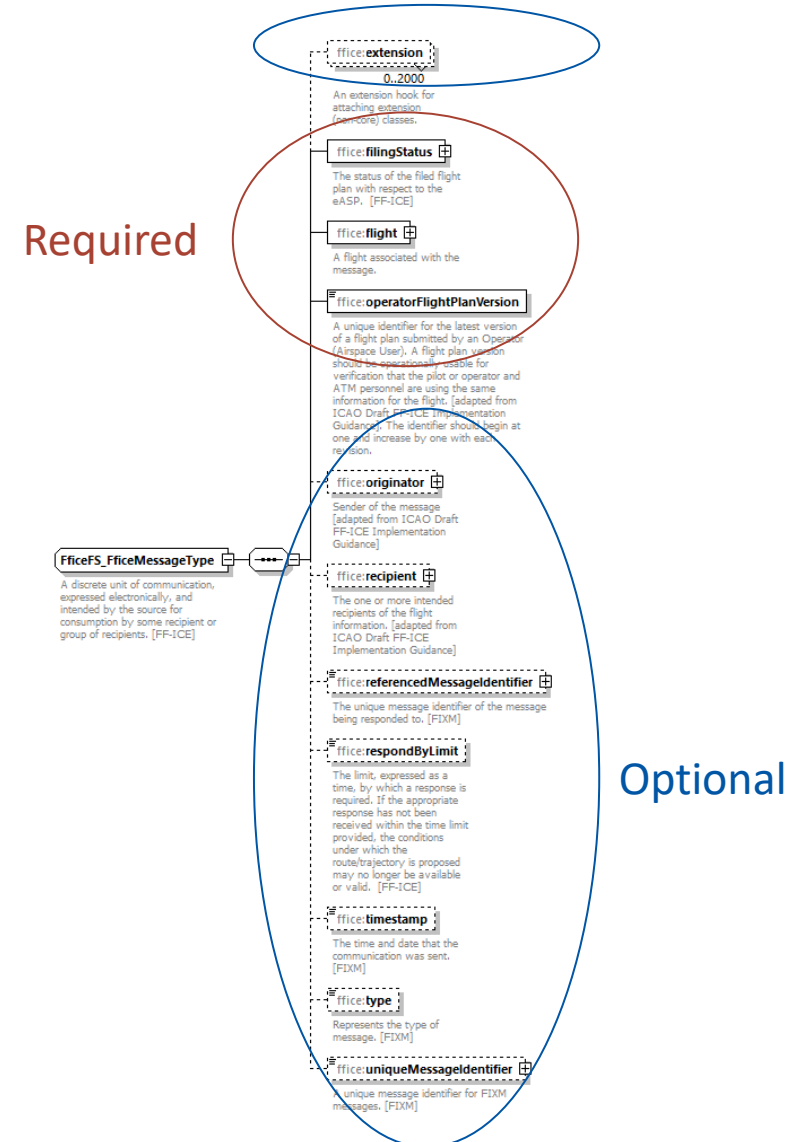
FIXM: FF-ICE Message Template

- The representations of the individual FF-ICE messages those are exchanged by the FF-ICE Services

- e.g. FF-ICE Filing Service uses 3 message templates:
  - FficeFFP_FficeMessageType
    (Filed Flight Plan)
  - FficeSR_FficeMessageType
    (Submission Response)
  - FficeFS_FficeMessageType
    (Filing Status)

- Each FF-ICE Message Template requires different elements
  - Also requires different FIXM Core elements
    - e.g. Filed Flight Plan requires Aircraft element but Filing Status does not require it

FIXM: FF-ICE Message Template - Example
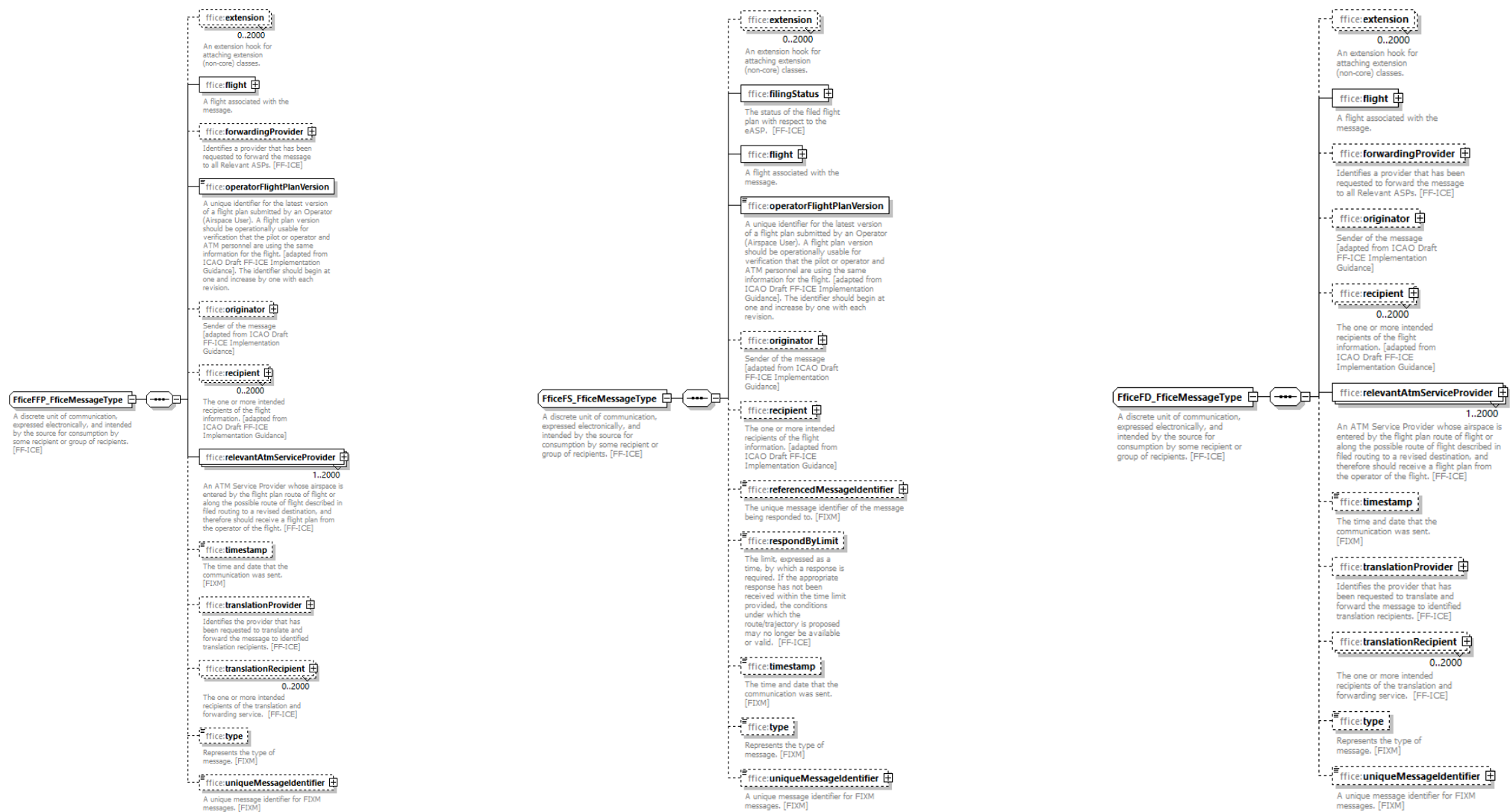
FIXM: Extension

- An extension may supplement FIXM Core or FIXM Application by defining additional data structures exchanged locally or regionally

- A Community can create an Extension used in the community by following guidance in fixm.aero website

- In APAC region, there are 2 extensions, FIXM version 4.1 and 4.2 APAC Extension, targeting ATFM and A-CDM requirements

- Note: Processing a FIXM message with unknown extensions requires consumers to remove those extensions before process it.

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<fx:Flight xmlns:apac="http://www.aerothai.aero/apac/1.0"
    xmlns:fb="http://www.fixm.aero/base/4.1"
    xmlns:mesg="http://www.fixm.aero/messaging/4.1"
    xmlns:fx="http://www.fixm.aero/flight/4.1"
    xmlns:xlink="http://www.w3.org/1999/xlink"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
    <fx:arrival>
        <fb:extension calculatedLandingTime="2024-05-29T10:58:00Z"
            xsi:type="apac:ApacArrivalType"/>
        <fx:destinationAerodrome
            xsi:type="fb:IcaoAerodromeReferenceType"
            locationIndicator="VHHH"/>
    </fx:arrival>
    <fx:departure estimatedOffBlockTime="2024-05-29T08:20:00Z">
        <fb:extension calculatedTakeOffTime="2024-05-29T08:53:00Z"
            xsi:type="apac:ApacDepartureType"/>
        <fx:aerodrome xsi:type="fb:IcaoAerodromeReferenceType"
            locationIndicator="VTBS"/>
    </fx:departure>
    <fx:flightIdentification aircraftIdentification="CPA770X"/>
    <fx:gufi codeSpace="urn:uuid">a03028e0-a7d1-4d6c-9d04-5bcb46666f0d</fx:gufi>
</fx:Flight>
```

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FIXM: GUFI

- GUFI is Globally Unique Flight Identifier.

- GUFI is intended to provided an unique reference to a specific flight and to distinguish between similar flights.

- In FIXM 4.3, a GUFI consists of an UUID version 4, a GUFI originator namespace and a creation timestamp.
  - In FIXM 4.2 and earlier version, a GUFI consists of only a UUID version 4.

- It is generated and allocated by the operator or the designated representative.

- In mix-mode environment, it is recommended that GUFI should be used as an additional key field to identify a flight.

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Generated by Google Gemini

FIXM: Benefit

- Machine-to-Machine readable
  - Developers can choose any XML parser tools to get information from a FIXM
  - Basic validation could be done by XML tools
- More Information
  - Flight Constraint
  - 4D Trajectory
- Extensibility
  - Communities can develop their own Extensions
  - Widely used Extensions could be included in FIXM Core easier via FIXM CCB

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Transition: Mapping of ATS Fields to FIXM

- Mapping of ATS fields to FIXM provided in the fixm.aero website

Transition: Mapping of ATS Fields to FIXM - Example

```
<fx:aircraft>
    <fx:aircraftAddress>123456</fx:aircraftAddress>
    <fx:aircraftType>
        <fx:type>
            <fx:icaoAircraftTypeDesignator>A320</fx:icaoAircraftTypeDesignator>
        </fx:type>
    </fx:aircraftType>
    <fx:capabilities>
        <fx:communication>
            <fx:communicationCapabilityCode>E1 E2 H Y</fx:communicationCapabilityCode>
            <fx:selectiveCallingCode>FKCH</fx:selectiveCallingCode>
        </fx:communication>
        <fx:navigation>
            <fx:navigationCapabilityCode>D F G I W</fx:navigationCapabilityCode>
            <fx:performanceBasedCode>A1 B1 C1 D1 L1 O1 S2</fx:performanceBasedCode>
        </fx:navigation>
        <fx:standardCapabilities>STANDARD</fx:standardCapabilities>
        <fx:surveillance>
            <fx:surveillanceCapabilityCode>B1 L</fx:surveillanceCapabilityCode>
        </fx:surveillance>
    </fx:capabilities>
    <fx:registration>HSXXXX</fx:registration>
    <fx:wakeTurbulence>M</fx:wakeTurbulence>
</fx:aircraft>
```

```
<fx:flightIdentification>
    <fx:aircraftIdentification>ABC123</fx:aircraftIdentification>
</fx:flightIdentification>
```

flight identification

aircraft

```
<fx:departure>
    <fx:aerodrome>
        <fb:locationIndicator>ADEP</fb:locationIndicator>
    </fx:aerodrome>
    <fx:estimatedOffBlockTime>2024-05-29T06:55:00Z</fx:estimatedOffBlockTime>
</fx:departure>
```

departure

```
(FPL-ABC123-IS
-A320/M-SDE1E2FGHIRWY/LB1
-ADEP0655
-N0460F340 SABIS Y8 SAVSA
-ADES0103 ALTN
-PBN/A1B1C1D1L1O1S2 DOF/240529 REG/HSXXXX SEL/FKCH CODE/123456 PER/C RMK/TCAS)
```

arrival

```
<fx:arrival>
    <fx:destinationAerodrome>
        <fb:locationIndicator>ADES</fb:locationIndicator>
    </fx:destinationAerodrome>
    <fx:destinationAerodromeAlternate>
        <fb:locationIndicator>ALTN</fb:locationIndicator>
    </fx:destinationAerodromeAlternate>
</fx:arrival>
```

route/trajectory

```
<fx:routeTrajectoryGroup>
    <fx:filed>
        <fx:element seqNum="0">
            <fx:elementStartPoint>
                <fb:designatedPoint>
                    <fb:designator>SABIS</fb:designator>
                </fb:designatedPoint>
            </fx:elementStartPoint>
            <fx:routeDesignatorToNextElement>
                <fx:routeDesignator>Y8</fx:routeDesignator>
            </fx:routeDesignatorToNextElement>
        </fx:element>
        <fx:element seqNum="1">
            <fx:elementStartPoint>
                <fb:designatedPoint>
                    <fb:designator>SAVSA</fb:designator>
                </fb:designatedPoint>
            </fx:elementStartPoint>
        </fx:element>
        <fx:routeInformation>
            <fx:cruisingLevel>
                <fb:flightLevel uom="FL">340</fb:flightLevel>
            </fx:cruisingLevel>
            <fx:cruisingSpeed uom="KT">460</fx:cruisingSpeed>
            <fx:flightRulesCategory>I</fx:flightRulesCategory>
            <fx:routeText>SABIS Y8 SAVSA</fx:routeText>
            <fx:totalEstimatedElapsedTime>PT1H3M</fx:totalEstimatedElapsedTime>
        </fx:routeInformation>
    </fx:filed>
</fx:routeTrajectoryGroup>
```

- Item 18 will be added/used into other element e.g. PBN/ and REG/ will be added in aircraft element, DOF/ will be included in EOBT

Transition: Translating between ATS Messages and FF-ICE Messages

- There is no direct translation between ATS Message and FF-ICE Message.

- The table only shows close relevant messages.

ATS Message	FF-ICE Template
	Preliminary Flight Plan
	Planning Status
	Submission Response
FPL	Filed Flight Plan
	Filing Status
DEP	Flight Departure
ARR	Flight Arrival
CHG	Flight Plan Update
DLA	Flight Plan Update
CNL	Flight Cancellation
RQP, RQS	Flight Data Request
SPL	Flight Data Response

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Thank You

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