



# SESAR Harmonised Cross Border Services API Specification

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## Introduction

The SESAR Harmonised Turbulence and 3D Radar services build a common aviation weather reference wherever you are in Europe, so that more optimal flight planning decisions can be made to avoid disruption and delays for passengers and cargo.

Through a better understanding of where potentially hazardous weather conditions will occur en-route, airlines and Air Traffic Control can reduce the number of reactive diversions which cause additional fuel burn resulting in increased CO2 emissions and costs.

The Met Office has worked with partners across Europe on three SESAR Deployment projects which provide aviation stakeholders with new tools to make dynamic decisions based on the prevailing weather conditions for all stages of a flight. The partners contributing to these operational services are DWD, Météo-France and the Met Office.



## Context

This document outlines the proposed SWIM compliant SESAR Harmonised Cross Border Services API.

**Please note: this document is in DRAFT status and is not a living document. Please refer to the documentation on the [SWIM Registry](#) for the most-up-to-date version of this API specification.**

## API Design: resources & endpoints

The base url shall be, this will be provided by a new AWS Route53 Hosted Zone:

`ip69-sesar.api.metoffice.gov.uk`

The following Resources have been identified and mapped to potential API endpoints:

Resource	HTTP Method	Endpoint	Purpose
Turbulence (full)	GET	<code>/api/v1/turbulence/full</code>	<ul style="list-style-type: none"> <li>Retrieve the latest full blended turbulence data.</li> <li>Returns GRIB2 file as a zip.</li> </ul>
Turbulence (subset)	GET	<code>/api/v1/turbulence/subset/{id}</code> Where: <code>id = unique subset id</code>	<ul style="list-style-type: none"> <li>Retrieve the latest blended subset turbulence data for a specific subset 'id'.</li> <li>Returns GRIB2 file as a zip.</li> </ul>
Turbulence (polygons)	GET	<code>/api/v1/turbulence/polygon/{level}</code> Where: <code>level = Turbulence level (1, 2 or 3).</code>	<ul style="list-style-type: none"> <li>Retrieve the latest polygon data.</li> <li>Returns geojson file.</li> </ul>
High Res HDF5 Radar (full)	GET	<code>/api/v1/radar/high-res/hdf5</code>	<ul style="list-style-type: none"> <li>Retrieve the latest full high res radar mosaic data.</li> <li>Returns HDF5 file as a zip.</li> </ul>
High Res Radar (subset)  This endpoint has been deprioritised.	GET	<code>/api/v1/radar/high-res/subset/{id}</code> Where: <code>id = unique subset id</code>	<ul style="list-style-type: none"> <li>Retrieve the latest subset radar mosaic data for a specific subset 'id'.</li> <li>Returns HDF5 file as a zip.</li> </ul>
Low Res HDF5 Radar (full)	GET	<code>/api/v1/radar/low-res/hdf5</code>	<ul style="list-style-type: none"> <li>Retrieve the latest full low res radar mosaic data.</li> <li>Returns HDF5 file as a zip.</li> </ul>

## API Design: subsets

Subsets			
Subset title	File path id	Description	Slide number
K-IRELAND FAB	/uk-ireland-fab	United Kingdom, Ireland	Slide 2
FAB EC	/fab-ec	(FAB Europe Central): France, Germany, Belgium, Netherlands, Luxembourg, and Switzerland	Slide 3
DK-SE-NE FAB	/dk-se-ne-fab	(North European FAB): Estonia, Finland, Latvia, Norway, Denmark, Sweden	Slide 4
DANUBE FAB	/danube-fab	Bulgaria, Romania	Slide 5
AB CE	/fab-ce	(FAB Central Europe): Czech Republic, Slovak Republic, Austria, Hungary, Croatia, Slovenia, Bosnia and Herzegovina	Slide 6
BALTIC FAB	/baltic-fab	Poland, Lithuania	Slide 7
BLUE MED FAB	/blue-med-fab	Italy, Malta, Greece, Cyprus, (Egypt, Tunisia, Albania, Jordan as observers)	Slide 8
SW FAB	/sw-fab	(South-West FAB): Portugal (Lisbon FIR), Spain	Slide 9
Manchester TMA	/manchester-tma	Manchester Terminal Airspace	Slide 10
Scotland TMA	/scotland-tma	Scottish Terminal Airspace	Slide 11

## Security

The end points shall be SWIM compliant and provide the following:

- Support HTTPS only and support public Certificate Authorities.
- Support Basic Authentication via HTTP Bearer Header.
- Protected by AWS CloudFront WAF.

All requests having a valid Bearer Header will be forwarded to MO AAA solution to perform Authentication and Authorisation. Only successfully authorised and authenticated requests will receive data (and a HTTP 200 OK response code). All other requests will receive HTTP 401/403 responses. All requests will be logged.

## SWAGGER Definition

The API definition has been captured as a OpenAPI 3.0 (Swagger) file shown below. This definition can be referenced from the SWIM specification to provide a self-contained description of the API.

Click here to expand...

```
{
  "openapi": "3.0.0",
  "info": {
    "title": "SESAR IP69 API",
    "description": "API for MO SESAR IP69, covering:\n\n- Turbulence: full, subsets and polygons.\n- Radar: high resolution full and subsets; low resolution.\n\n ",
    "contact": {},
    "version": "0.1"
  },
  "servers": [
    {
      "url": "https://ip69-sesar.api.metoffice.gov.uk",
      "variables": {},
      "description": "MO SESAR Production API"
    }
  ],
  "components": {
    "securitySchemes": {
      "Bearer": {
        "type": "http",
        "scheme": "bearer",
        "bearerFormat": "JWT"
      }
    }
  },
  "paths": {
    "/api/v1/turbulence/full": {
      "get": {
        "tags": [
          "Turbulence"
        ],
        "summary": "GET Turbulence",
        "description": "Request latest full pan European turbulence data.\n\nReturns a zip file containing GRIB2 turbulence data.",
        "operationId": "GETTurbulence",
        "parameters": [],
        "responses": {
          "200": {
            "description": "Zip file containing the GRIB2 data",
            "headers": {},
            "content": {
              "application/octet-stream": {
                "schema": {
                  "type": "string",
                  "format": "binary"
                }
              }
            }
          }
        }
      }
    }
  }
}
```

```
    },
    "401": {
      "description": "Request is not authorised",
      "content": {
        "application/json": {
          "schema": {}
        }
      }
    },
    "403": {
      "description": "Request is forbidden",
      "content": {
        "application/json": {
          "schema": {}
        }
      }
    },
    "404": {
      "description": "Requested resource does not exist.",
      "content": {
        "application/json": {
          "schema": {}
        }
      }
    },
    "500": {
      "description": "Server Error. The SESAR server failed in an unexpected
manner.",
      "content": {
        "application/json": {
          "schema": {}
        }
      }
    },
    "503": {
      "description": "Service unavailable. This is typically a transient
error, please retry the request.",
      "content": {
        "application/json": {
          "schema": {}
        }
      }
    }
  },
  "deprecated": false
}
},
"/api/v1/turbulence/subset/{subset-id}": {
  "get": {
    "tags": [
      "Turbulence"
    ],
    "summary": "GET Turbulence (Subset)",
    "description": "Request latest subset of Pan European turbulence data for a
given subset-id\n\nReturns a zip file containing GRIB2 turbulence data.",
    "operationId": "GETTurbulence (Subset)",
    "parameters": [
      {
```

```
"name": "subset-id",
"in": "path",
"description": "Id of the subset to request",
"required": true,
"explode": true,
"schema": {
  "enum": [
    "UK-IRELAND FAB",
    "FAB EC",
    "DK-SE-NE FAB",
    "DANUBE FAB",
    "AB CE",
    "BALTIC FAB",
    "BLUE MED FAB",
    "SW FAB",
    "Manchester TMA",
    "Scotland TMA"
  ],
  "type": "string",
  "example": "UK-IRELAND FAB"
}
],
"responses": {
  "200": {
    "description": "Zip file containing the GRIB2 data",
    "headers": {},
    "content": {
      "application/octet-stream": {
        "schema": {
          "type": "string",
          "format": "binary"
        }
      }
    }
  },
  "401": {
    "description": "Request is not authorised",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "403": {
    "description": "Request is forbidden",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "404": {
    "description": "Requested resource does not exist.",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  }
}
```



```
    }
  },
  "500": {
    "description": "Server Error. The SESAR server failed in an unexpected
manner.",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "503": {
    "description": "Service unavailable. This is typically a transient
error, please retry the request.",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "deprecated": false
},
"/api/v1/turbulence/polygon/{level}": {
  "get": {
    "tags": [
      "Turbulence"
    ],
    "summary": "GET Turbulence (Polygon)",
    "description": "Request latest Pan European turbulence polygon data for a
given turbulence level.\n\nReturns GeoJson.",
    "operationId": "GETTurbulence(Polygon)",
    "parameters": [
      {
        "name": "level",
        "in": "path",
        "description": "Turbulence level",
        "required": true,
        "explode": true,
        "schema": {
          "enum": [
            "1",
            "2",
            "3"
          ],
          "type": "string",
          "example": "1"
        }
      }
    ],
    "responses": {
      "200": {
        "description": "Zip file containing the geojson data",
        "headers": {
          "x-sesar-included-forecast-periods": {
            "schema": {
```

```
        "type": "string"
      },
      "description": " Lists forecast periods included in the file. If
there is no turbulence for a forecast period and it is in the header, it means there
is no turbulence for that period. \n\nIf the period is missing from the header and
there is no turbulence, it means the original data was missing or corrupt and there
could be turbulence.\n\nWhen all are there it should look like this
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,27,30,33,36."
    }
  },
  "content": {
    "application/octet-stream": {
      "schema": {
        "type": "string",
        "format": "binary"
      }
    }
  }
},
"401": {
  "description": "Request is not authorised",
  "content": {
    "application/json": {
      "schema": {}
    }
  }
},
"403": {
  "description": "Request is forbidden",
  "content": {
    "application/json": {
      "schema": {}
    }
  }
},
"404": {
  "description": "Requested resource does not exist.",
  "content": {
    "application/json": {
      "schema": {}
    }
  }
},
"500": {
  "description": "Server Error. The SESAR server failed in an unexpected
manner.",
  "content": {
    "application/json": {
      "schema": {}
    }
  }
},
"503": {
  "description": "Service unavailable. This is typically a transient
error, please retry the request.",
  "content": {
    "application/json": {
```

```
        "schema": {}
      }
    }
  },
  "deprecated": false
}
},
"/api/v1/radar/highres": {
  "get": {
    "tags": [
      "Radar"
    ],
    "summary": "GET Radar (High Res)",
    "description": "Retrieve the latest full high res radar mosaic
data.\n\nReturns HDF5 file as a zip.",
    "operationId": "GETRadar(HighRes)",
    "parameters": [],
    "responses": {
      "200": {
        "description": "",
        "headers": {},
        "content": {
          "application/octet-stream": {
            "schema": {
              "type": "string",
              "format": "binary"
            }
          }
        }
      },
      "401": {
        "description": "Request is not authorised",
        "content": {
          "application/json": {
            "schema": {}
          }
        }
      },
      "403": {
        "description": "Request is forbidden",
        "content": {
          "application/json": {
            "schema": {}
          }
        }
      },
      "404": {
        "description": "Requested resource does not exist.",
        "content": {
          "application/json": {
            "schema": {}
          }
        }
      },
      "500": {
```

```
"description": "Server Error. The SESAR server failed in an unexpected manner.",
  "content": {
    "application/json": {
      "schema": {}
    }
  }
},
"503": {
  "description": "Service unavailable. This is typically a transient
error, please retry the request.",
  "content": {
    "application/json": {
      "schema": {}
    }
  }
},
"deprecated": false
}
},
"/api/v1/radar/lowres": {
  "get": {
    "tags": [
      "Radar"
    ],
    "summary": "GET Radar (Low Res)",
    "description": "Retrieve the latest full low res radar mosaic
data.\n\nReturns HDF5 file as a zip.",
    "operationId": "GETRadar(LowRes)",
    "parameters": [],
    "responses": {
      "200": {
        "description": "",
        "headers": {},
        "content": {
          "application/octet-stream": {
            "schema": {
              "type": "string",
              "format": "binary"
            }
          }
        }
      },
      "401": {
        "description": "Request is not authorised",
        "content": {
          "application/json": {
            "schema": {}
          }
        }
      },
      "403": {
        "description": "Request is forbidden",
        "content": {
          "application/json": {
            "schema": {}
          }
        }
      }
    }
  }
}
```

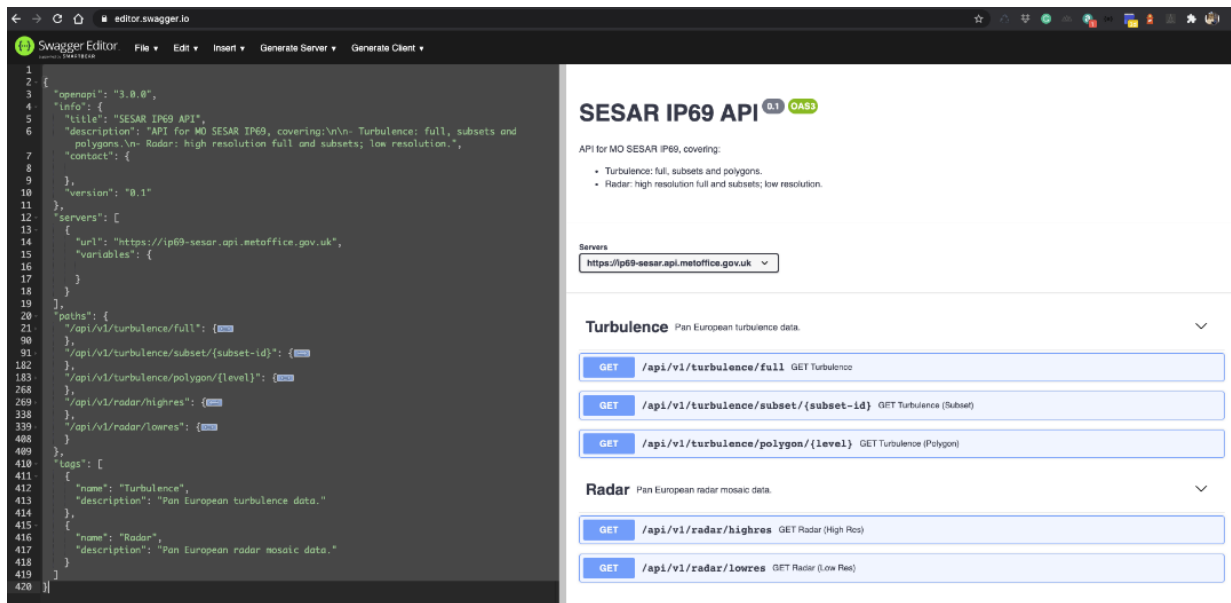
```
    }
  },
  "404": {
    "description": "Requested resource does not exist.",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "500": {
    "description": "Server Error. The SESAR server failed in an unexpected
manner.",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "503": {
    "description": "Service unavailable. This is typically a transient
error, please retry the request.",
    "content": {
      "application/json": {
        "schema": {}
      }
    }
  },
  "deprecated": false
}
},
"security": [
  {
    "Bearer": []
  }
],
"tags": [
  {
    "name": "Turbulence",
    "description": "Pan European turbulence data."
  },
  {
    "name": "Radar",
    "description": "Pan European radar mosaic data."
  }
]
}
```

## Human readable version

A human readable presentation of the file can be seen by viewing the file here:

<https://editor.swagger.io/>,

which will look similar to:



## Further assistance

If you have any questions about the onboarding process or setting up the APIs, please contact:

[SESARServicesManager@metoffice.gov.uk](mailto:SESARServicesManager@metoffice.gov.uk)