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M. A. Jadoon
S. Robitzsch
InterDigital Europe
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A YANG Data Model for Reporting Utilization Scores in ISAC
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Abstract

This document defines a basic YANG data model to report sensing measurements utilization score (US) in Integrated Sensing and Communication (ISAC) systems. The score quantifies the resource impact of different sensing measurements, including compute, memory, storage, energy, and latency. The model supports per-measurement telemetry reporting.

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1. Introduction

ISAC introduces a paradigm where network nodes perform both communication and sensing tasks. Several use cases and their requirements for ISAC have been defined in 3GPP [TR22.837] and ETSI[GR-ISC001]. A sensing task involves measurements of parameters such as Doppler, angle of arrival (AoA), and radar cross section (RCS), micro-doppler, range/delay [Jadoon2025] etc., each consumes varying amounts of system resources such as memory, energy, storage.

To enable energy-efficient orchestration, it is important to measure and report the utilization impact of each measurement for a sensing task. This draft proposes a YANG data model that allows ISAC-enabled devices to report an SMUS per sensing task, computed from weighted metrics such as CPU usage, memory, energy draw, storage load, and latency.

2. Model Scope

The model is intended for systems that support ISAC and want to participate in energy-aware operations.

3. Tree Diagram

```

module: ietf-isac-utilization
  +--ro sensing-utilization
    +--ro function-score* [function]
      +--ro function                                sensing-function
      +--ro score-components
        | +--ro compute-score?                      decimal64
        | +--ro memory-score?                      decimal64
        | +--ro energy-score?                      decimal64
        | +--ro storage-score?                     decimal64
        | +--ro latency-score?                     decimal64
      +--ro weights
        | +--ro compute-weight?                    decimal64
        | +--ro memory-weight?                    decimal64
        | +--ro energy-weight?                    decimal64
        | +--ro storage-weight?                    decimal64
        | +--ro latency-weight?                    decimal64
      +--ro total-utilization-score?               uint8

```

4. YANG Module

```

module ietf-isac-utilization {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-isac-utilization";
  prefix isac-util;

  organization "InterDigital Europe";
  contact "Muhammad Awais Jadoon <muhammad.awaisjadoon@interdigital.com>";

  description
    "YANG data model for reporting ISAC sensing resource utilization scores.";

  revision "2025-06-28" {
    description "Initial version.";
  }

  typedef sensing-function {
    type enumeration {
      enum delay {
        description "Time delay measurement representing target range.";
      }
      enum doppler {
        description "Doppler shift measurement representing target velocity.";
      }
      enum micro-doppler {
        description "Micro-Doppler analysis for fine-grained motion of target.";
      }
      enum aoa {
        description "Angle of Arrival estimation.";
      }
    }
  }

```

```

    }
    enum rcs {
        description "Radar Cross Section estimation.";
    }
}
description "Enumerates supported sensing measurement functions within ISAC system
s.";
}

container sensing-utilization {
    config false;

    list function-score {
        key "function";
        leaf function {
            type sensing-function;
        }

        container score-components {
            leaf compute-score { type decimal64 { fraction-digits 2; } units "%"; }
            leaf memory-score { type decimal64 { fraction-digits 2; } units "%"; }
            leaf energy-score { type decimal64 { fraction-digits 2; } units "%"; }
            leaf storage-score { type decimal64 { fraction-digits 2; } units "%"; }
            leaf latency-score { type decimal64 { fraction-digits 2; } units "%"; }
        }

        container weights {
            leaf compute-weight { type decimal64 { fraction-digits 2; } units "ratio"; }
            leaf memory-weight { type decimal64 { fraction-digits 2; } units "ratio"; }
            leaf energy-weight { type decimal64 { fraction-digits 2; } units "ratio"; }
            leaf storage-weight { type decimal64 { fraction-digits 2; } units "ratio"; }
            leaf latency-weight { type decimal64 { fraction-digits 2; } units "ratio"; }
        }

        leaf total-utilization-score {
            type uint8;
            description "Composite score (0100) aggregating all measurements.";
        }
    }
}
}

```

Note: The sensing measurement types defined in this document (e.g., Delay, Doppler, micro-Doppler, AoA, RCS) is not exhaustive. The YANG model is extensible, and additional sensing measurements may be incorporated as the standards develop.

4.1. JSON Encoding Example

```
{
  "ietf-isac-utilization:sensing-utilization": {
    "function-score": [
      {
        "function": "micro-doppler",
        "score-components": {
          "compute-score": 82.0,
          "memory-score": 60.0,
          "energy-score": 75.0,
          "storage-score": 50.0,
          "latency-score": 45.0
        },
        "weights": {
          "compute-weight": 0.3,
          "memory-weight": 0.2,
          "energy-weight": 0.3,
          "storage-weight": 0.1,
          "latency-weight": 0.1
        },
        "total-utilization-score": 70
      }
    ]
  }
}
```

5. Security Considerations

TBD

6. IANA Considerations

TBD

7. Acknowledgements

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8. Normative References

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Authors' Addresses

Muhammad Awais Jadoon
InterDigital Europe
United Kingdom
Email: muhammad.awaisjadoon@interdigital.com

Sebastian Robitzsch
InterDigital Europe
United Kingdom
Email: Sebastian.Robitzsch@InterDigital.com