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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), radar cross section (RCS), micro-doppler, and range/delay [Jadoon2025], each consuming varying amounts of system resources such as memory, energy, and storage.

To enable energy-efficient orchestration, it is important to measure and report the utilization impact of sensing measurements for a sensing task. This draft proposes a YANG data model that allows ISAC-enabled devices to report a utilization score (US) 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. YANG Tree

```

module: ietf-isac-utilization
  +--ro sensing-utilization
    +--ro total-utilization-score      uint8
    +--ro timestamp?                  yang:date-and-time
    +--ro window?                      string
    +--ro parameters?                  if-feature component-breakdown
      | +--ro compute-score?           decimal64
      | +--ro memory-score?            decimal64
      | +--ro energy-score?            decimal64
      | +--ro storage-score?           decimal64
      | +--ro latency-score?           decimal64
    +--ro function-score* [function]   if-feature per-measurement
      +--ro function                   sensing-function
      +--ro total-utilization-score?   uint8
      +--ro timestamp?                 yang:date-and-time
      +--ro window?                     string
      +--ro parameters?                 if-feature component-breakdown
        +--ro compute-score?           decimal64
        +--ro memory-score?            decimal64
        +--ro energy-score?            decimal64
        +--ro storage-score?           decimal64
        +--ro latency-score?           decimal64

```

4. YANG Module

```

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

  import ietf-yang-types {
    prefix yang;
    reference "RFC 6991: Common YANG Data Types";
  }

  organization "InterDigital Europe";
  contact "Muhammad Awais Jadoon <muhammad.awaisjadoon@interdigital.com>";
  description
    "Reports a mandatory total utilization score for ISAC systems.
    Optionally exposes a per-parameter breakdown and per-measurement
    scores.";

  revision "2025-10-17" {
    description
      "Making per-parameter breakdown and per-measurement reporting; add timestamp/window
      .";
  }

  feature component-breakdown {

```

```
    description
      "Expose optional per-parameter components (compute, memory,
       energy, storage, latency) that contribute to the total score.";
  }

  feature per-measurement {
    description
      "Expose optional per-measurement (e.g., delay, Doppler) scores.";
  }

  typedef percent {
    type decimal64 { fraction-digits 2; }
    units "%";
    description "Percentage 0..100 (not range-restricted here).";
  }

  typedef duration-string {
    type string;
    description "Human-readable or ISO-8601 duration (e.g., PT60S).";
  }

  container sensing-utilization {
    config false;
    description "Sensing utilization score.";

    leaf total-utilization-score {
      type uint8;
      mandatory true;
      description "Composite utilization score (0..100).";
    }

    leaf timestamp {
      type yang:date-and-time;
      description "Time when the utilization score was computed.";
    }

    leaf window {
      type duration-string;
      description "Aggregation window (e.g., PT60S).";
    }

    container parameters {
      if-feature component-breakdown;
      description "Optional per-parameter components.";
      leaf compute-score { type percent; }
      leaf memory-score { type percent; }
      leaf energy-score { type percent; }
      leaf storage-score { type percent; }
```

```

    leaf latency-score { type percent; }
  }

  list function-score {
    if-feature per-measurement;
    key "function";
    description "Optional per-measurement utilization scores.";
    leaf function {
      type enumeration {
        enum delay;
        enum doppler;
        enum micro-doppler;
        enum aoa;
        enum rcs;
      }
      description "Type of sensing measurement.";
    }
    leaf total-utilization-score { type uint8; description "Per-measurement total (0..100)."; }
    leaf timestamp { type yang:date-and-time; }
    leaf window { type duration-string; }
    container parameters {
      if-feature component-breakdown;
      leaf compute-score { type percent; }
      leaf memory-score { type percent; }
      leaf energy-score { type percent; }
      leaf storage-score { type percent; }
      leaf latency-score { type percent; }
    }
  }
}

```

4.1. JSON Encoding example

JSON encoding example for the total utilization score:

```

{
  "ietf-isac-utilization:sensing-utilization": {
    "total-utilization-score": 53,
    "timestamp": "2025-10-17T09:00:00Z",
    "window": "PT60S"
  }
}

```

5. Security Considerations

TBD

6. IANA Considerations

TBD

7. Acknowledgements

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Sebastian Robitzsch

8. Normative References

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