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**Internet of things - Collaborative information
processing reference model**

物联网 协同信息处理参考模型

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Internet of things - Collaborative information processing reference model

1 Scope

This Standard proposes the collaborative information processing reference model of tasks or services in the Internet of Things system, and specifies entity functions and collaborative information processing processes.

This Standard applies to the design and development of collaborative information processing in IoT systems.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 30269.2-2013, Information Technology - Sensor Networks - Part 2: Terminology

GB/T 30269.401-2015, Information technology - Sensor networks - Part 401: Collaborative information processing: Services and interfaces supporting collaborative information processing

GB/T 33474-2016, Internet of things - Reference architecture

GB/T 33745-2017, Internet of things - Terminology

3 Terms and definitions

Terms and definitions determined by GB/T 30269.2-2013, GB/T 30269.401-2015, GB/T 33745-2017, and the following ones are applicable to this document.

3.1 Collaborative information processing

An information processing process in which multiple entities cooperate with each other to accomplish a certain task or provide a certain service.

Note: Rewrite GB/T 30269.401-2015, definition 3.2.

		subtasks and the needs of entities in terms of sensing, storage, computing, dynamically plan and monitor interactions and collaborations between subtask executive entities, indirectly achieve data sharing and resource complementation between subtask executive entities, so that each entity completes subtasks.
	Distributed subtask processing	During subtask processing, each subtask executive entity uses user-defined rules or self-learning mechanisms. The entities directly perform interaction and collaboration with each other, and autonomously adjust the needs of each entity in terms of sensing, storage, and computing according to the needs of the subtask, realize data sharing and resource complementation between subtask executive entities, so that each subtask executive entity completes subtasks.
	Hybrid subtask processing	During subtask processing, some subtask executive entities cooperate to complete subtasks in a distributed subtask processing mode, and some subtask executive entities complete subtasks in a centralized subtask processing mode.
Capability monitoring	Sensing capability monitoring	Collect the performance parameters and operating status data (such as sensor modalities and their configuration, sensing range, location) of subtask executive entities in real time or at regular intervals, and analyze them.
	Computing capability monitoring	Collect the performance parameters and operating status data of the processors of the subtask executive entities in real time or at regular intervals, and perform analysis.
	Communication capability monitoring	Collect the communication performance parameters and status data of the subtask executive entities in real time or at regular intervals, and perform analysis.
	Other capability monitoring	Collect performance parameters and status data other than the sensing, computing, and communication capabilities of subtask executive entities, such as storage, visualization and other performance parameters, in real time or at regular intervals, and perform analysis; sensor data characteristic information, signal-to-noise ratio, signal strength, distance estimation of single target (or multiple targets) and entities, state parameter estimation, etc.
Capability declaration		Subtask executive entity reports its own sensing, computing, communication, and other capabilities to the collaborative entity.

a) Task decomposition phase:

- 1) Task input: the collaborative strategy planning function entity obtains task requirements and description information, as shown in (1) of Figure 3;
- 2) Task decomposition: the collaborative strategy planning function entity decomposes the task into subtasks according to the capability declaration information of task and entity, and sends the subtask and entity capability information to the capability assessment function entity, as shown in (2) of Figure 3;
- 3) Send the capability assessment result: the capability assessment function entity completes the capability assessment of the entity according to the capability declaration of each entity and the degree of matching between subtasks, and sends the entity's assessment result to the collaborative strategy planning function entity, as shown in (3) of figure 3;
- 4) Task allocation: according to the task information and capability assessment results, the collaborative strategy planning function entity determines subtasks and subtask executive entities, determines centralized, distributed, and hybrid subtask processing modes, and sends subtask information to the corresponding subtask executive entity, as shown in (4) of Figure 3.

b) Subtask processing phase:

- 1) Subtask processing information interaction: according to the centralized, distributed, hybrid subtask processing mode, entities perform subtask processing information interaction. Distributed subtask information interaction occurs between subtask executive entities, as shown in (5-1) of Figure 3; centralized subtask information interaction occurs between collaborative strategy planning function entities and subtask executive entities, as shown in (5-2) of Figure 3; hybrid subtask information interaction includes distributed [(5-1) of Figure 3] and centralized [(5-2) of Figure 3];
- 2) Subtask processing: according to the centralized, distributed, and hybrid subtask processing mode, each subtask executive entity completes its subtask processing and informs the collaborative effectiveness assessment function entity of the processing result.

c) Collaborative effectiveness assessment phase:

- 1) Collaborative effectiveness assessment: the collaborative effectiveness assessment function entity performs summary, combination, and

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